

Left Main and Bifurcation Stenting: Current status and Perspectives

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Disclosure Statement of Financial Interest

I, (Zhang Jun-Jie) DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation.



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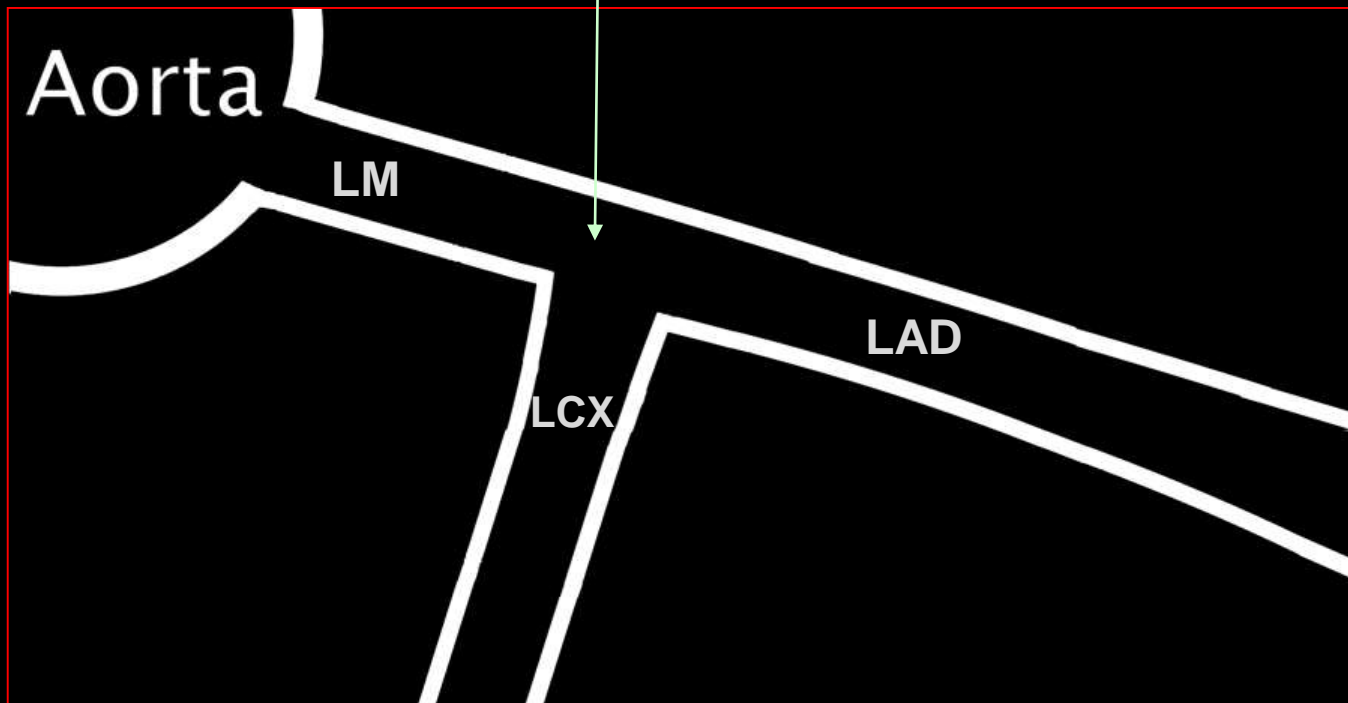


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Location of LM disease

EXCEL trial--LM PCI group(N=942)

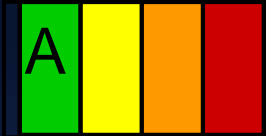
Distal LM n=771(81.8%)



2011 ACC/AHA/SCAI Guidelines

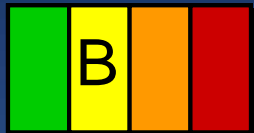
Provisional vs Elective SB stenting

I IIa IIb III



Provisional side-branch stenting should be the initial approach in patients with bifurcation lesions when the side branch is not large and has only mild or moderate foal disease at the ostium

I IIa IIb III



It is reasonable to use elective double stenting in patients with complex bifurcation morphology involving a large side branch where the risk of side-branch occlusion is high and the likelihood of successful side branch re access is low



2011 ACC/AHA/SCAI Guidelines

Provisional vs Elective SB stenting

I IIa IIb III



Provisional stenting should be the initial

What is complex bifurcation lesion?

I IIa IIb III



It is reasonable to use elective double stenting in patients with complex bifurcation morphology involving a large side branch where the risk of side-branch occlusion is high and the likelihood of successful side branch re access is low

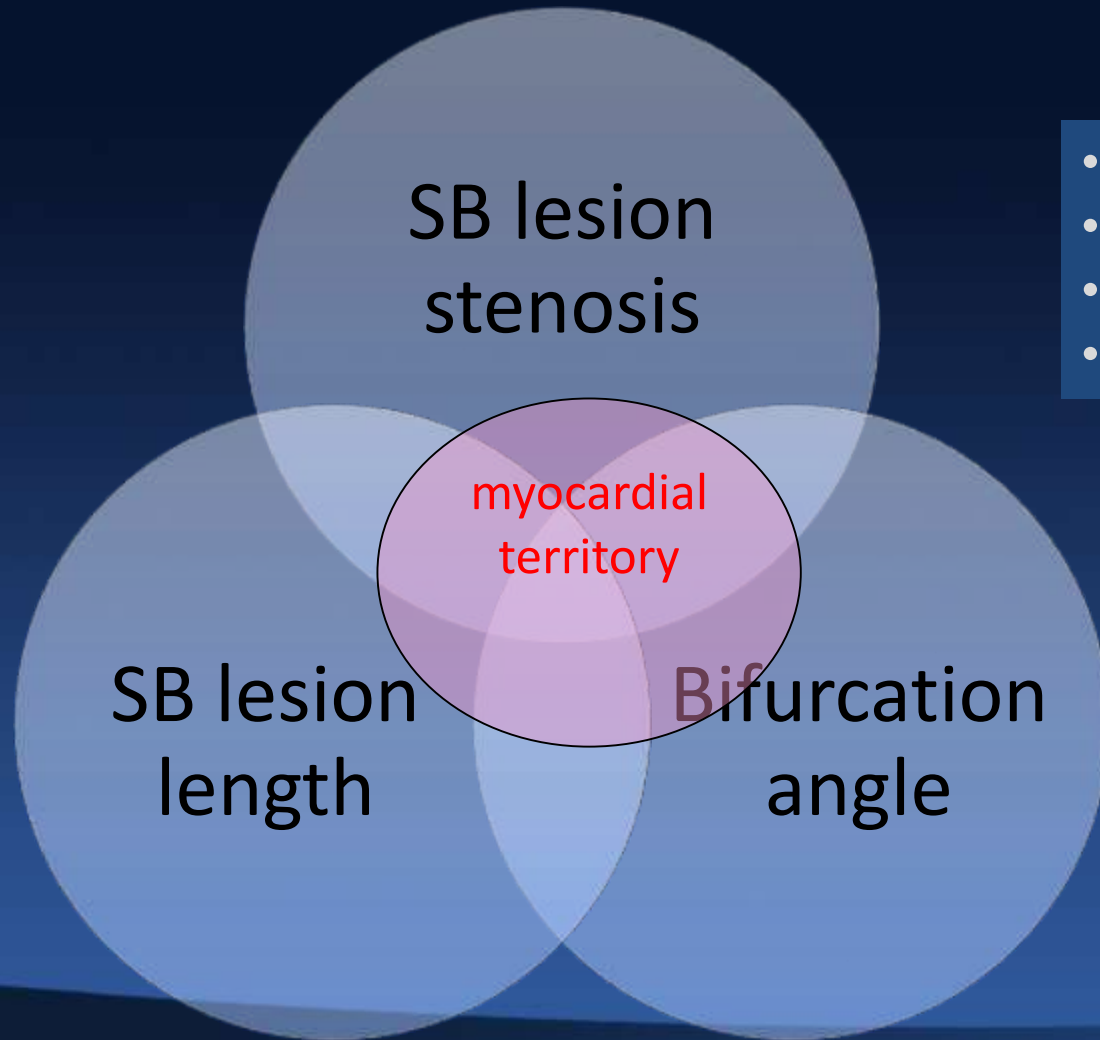


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What is complex bifurcations?



- Severe Calcified
- Thrombus containing
- Small vessel
-



Impact of the Complexity of Bifurcation Lesions Treated With Drug-Eluting Stents

The DEFINITION Study

Shao-Liang Chen, MD,* Imad Sheiban, MD,† Bo Xu, MBBS,‡ Nigel Jepson, MD,§ Chitprapai Paiboon, MD,|| Jun-Jie Zhang, PhD,¶ Fei Ye, MD,¶ Teugh Sansoto, MD,# Tak W. Kwan, MD,** Michael Lee, MD,†† Ya-Ling Han, MD,†† Shu-Zheng Lv, MD,§§ Shang-Yu Wen, MD,||| Qi Zhang, MD,¶¶ Hai-Chang Wang, MD,## Tie-Ming Jiang, MD,*** Yan Wang, MD,††† Liang-Long Chen, MD,††† Nai-Liang Tian, MD,* Feng Cao, MD,## Chun-Guang Qiu, MD,§§§ Yao-Jun Zhang, PhD,¶ Martin B. Leon, MD,||||

Inclusion criteria:

----SB diameter ≥ 2.5 mm

----Medina 1,1,1 or 0,1,1

----Prospective registry

----Multi-center



DEFINITION Study Flowchart

1550 patients with true bifurcation lesions



To build criteria of lesions complexity



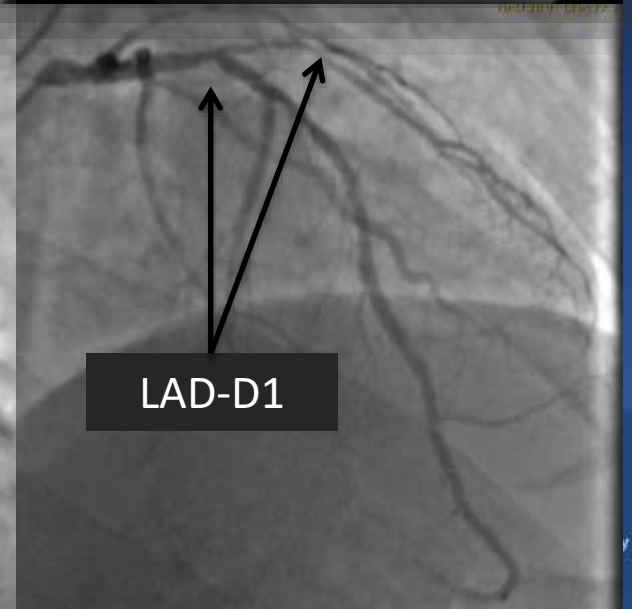
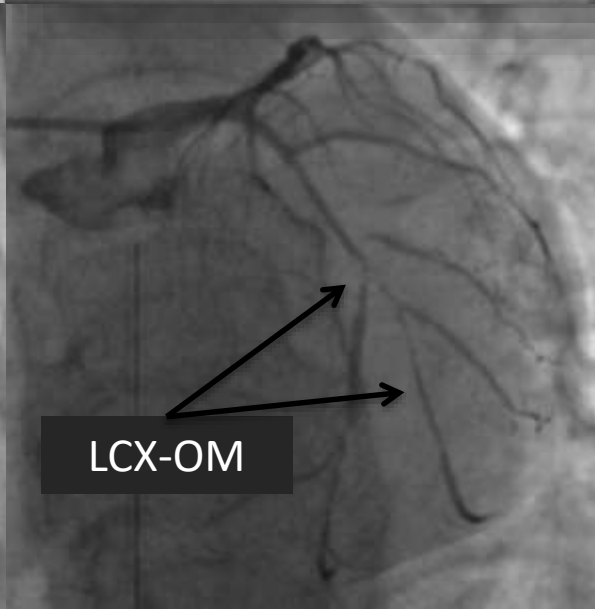
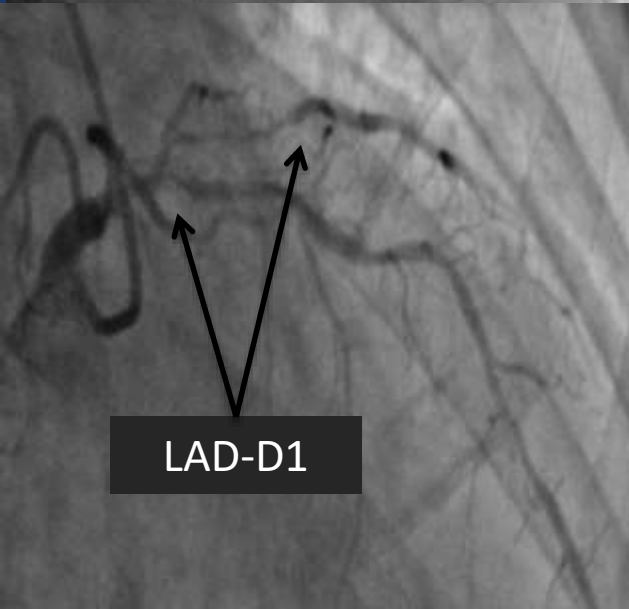
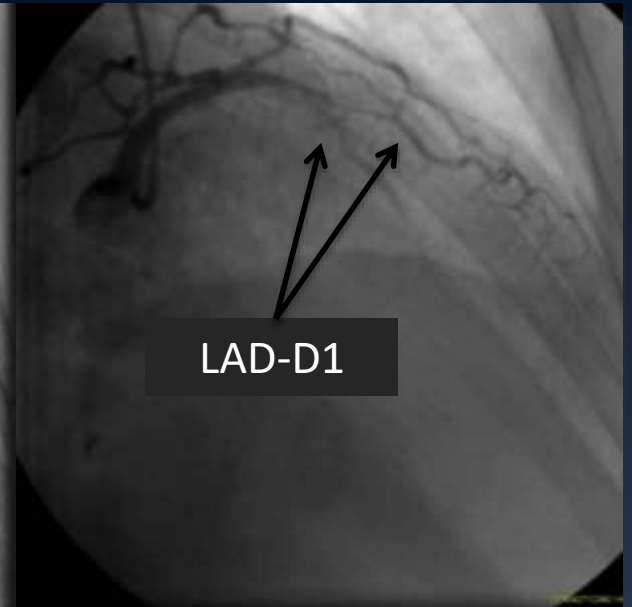
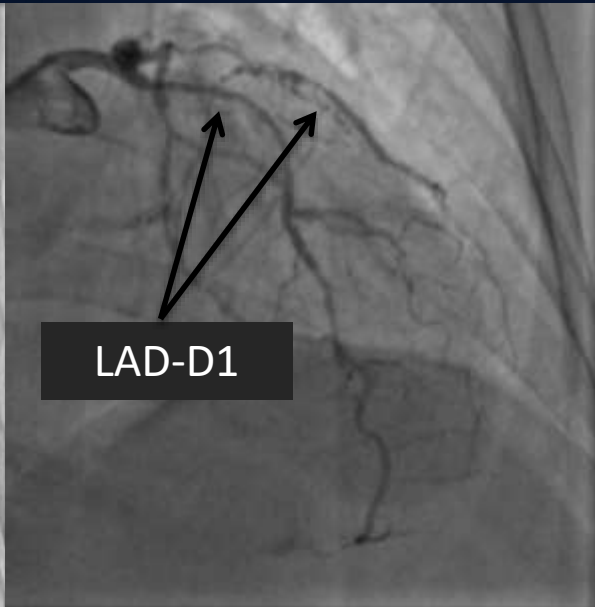
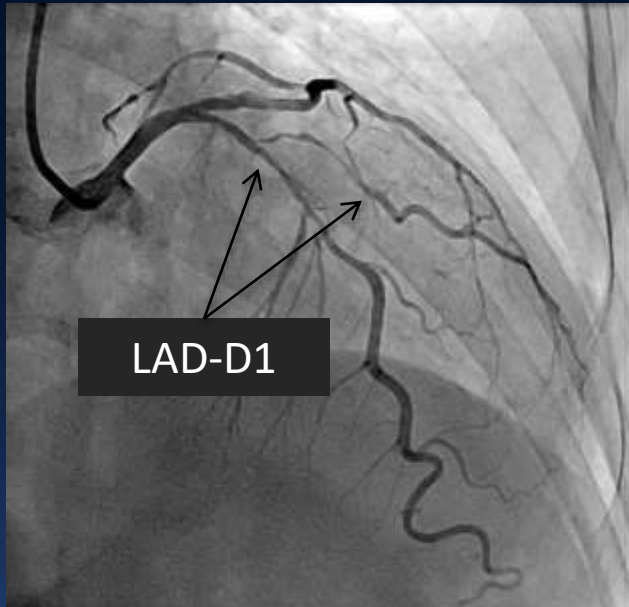
Criteria of lesions complexity

**To test these criteria in another 3660 patients
With bifurcation lesions**

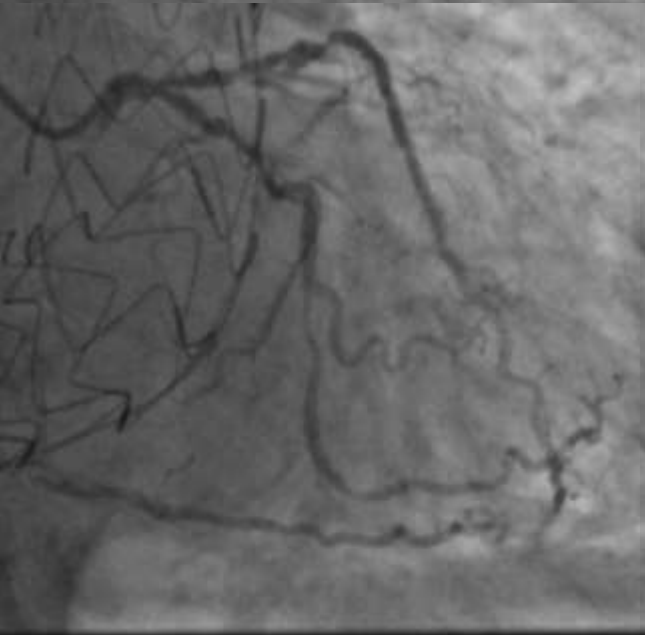
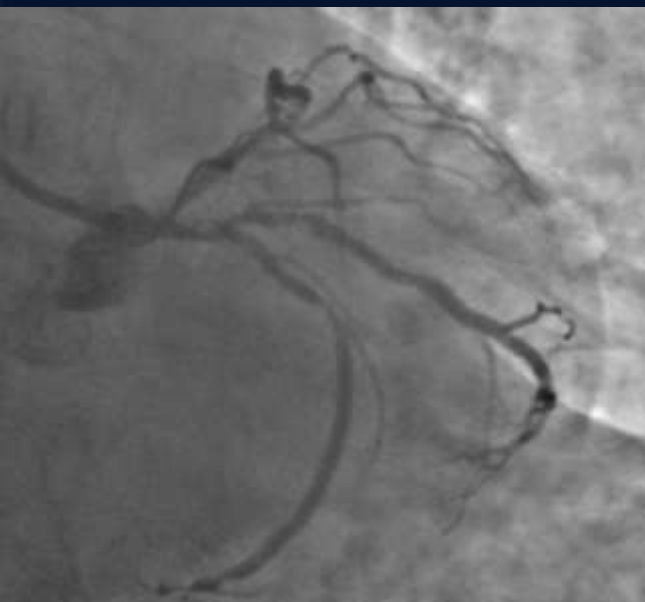
DEFINITION criteria

	P	Sensitivity (%)	Specificity (%)
Major :CX-DS \geq 70%, CX-LL \geq 10mm	<0.001	80	72
SB-DS \geq 90%, SB-LL \geq 10mm	<0.001	80	74
Minor: >mild calcification	0.002	64	65
Multiple lesions	0.007	68	60
thrombus-containing	0.004	64	53
MV-LL \geq 25 mm	0.010	69	58
Angle<45 ⁰ or >70 ⁰	0.002	66	64
MV-RVD \leq 2.5 mm	0.010	57	66
Major 1 + any 2 of minor criteria	-----	87	83
Major 2+ any 2 of minor criteria	-----	88	83

Complex non-LM BLs

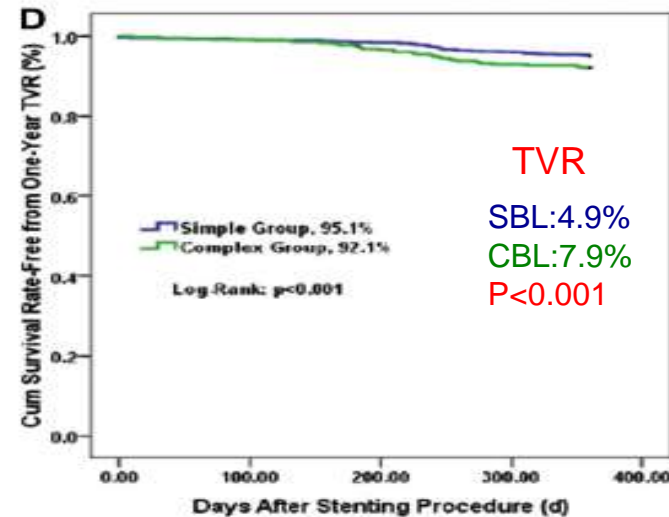
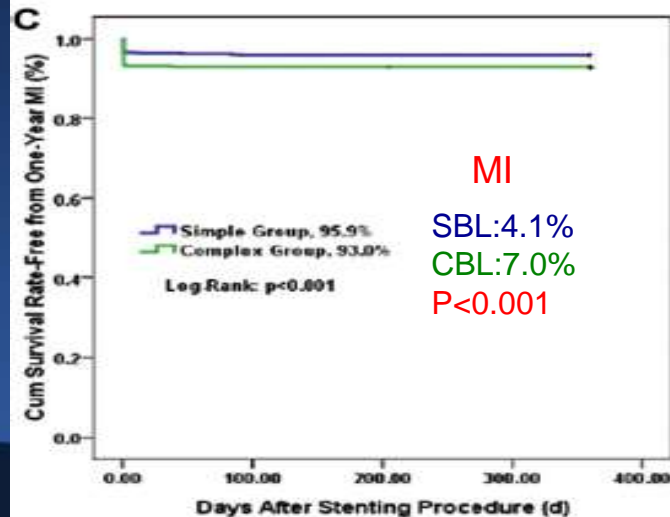
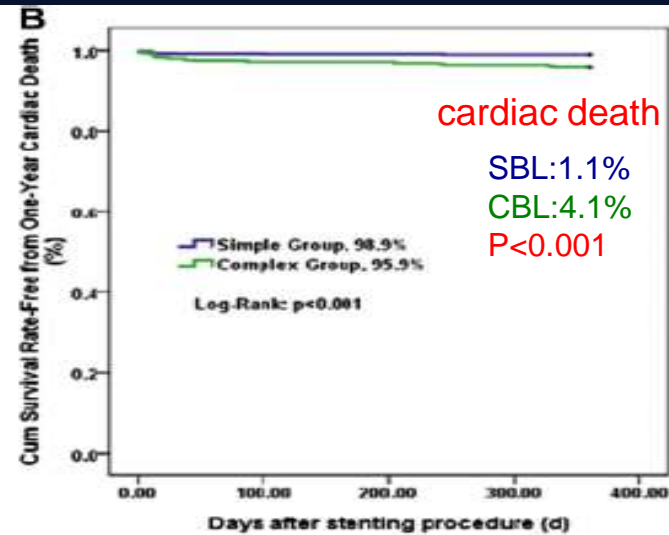
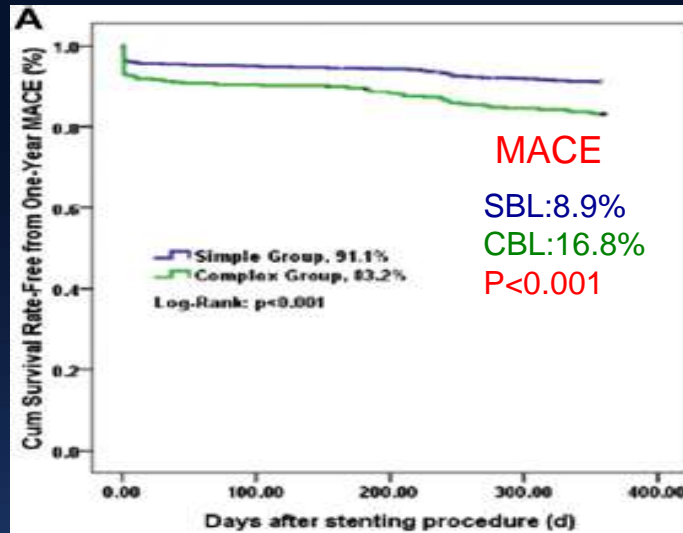


Complex LM BLs



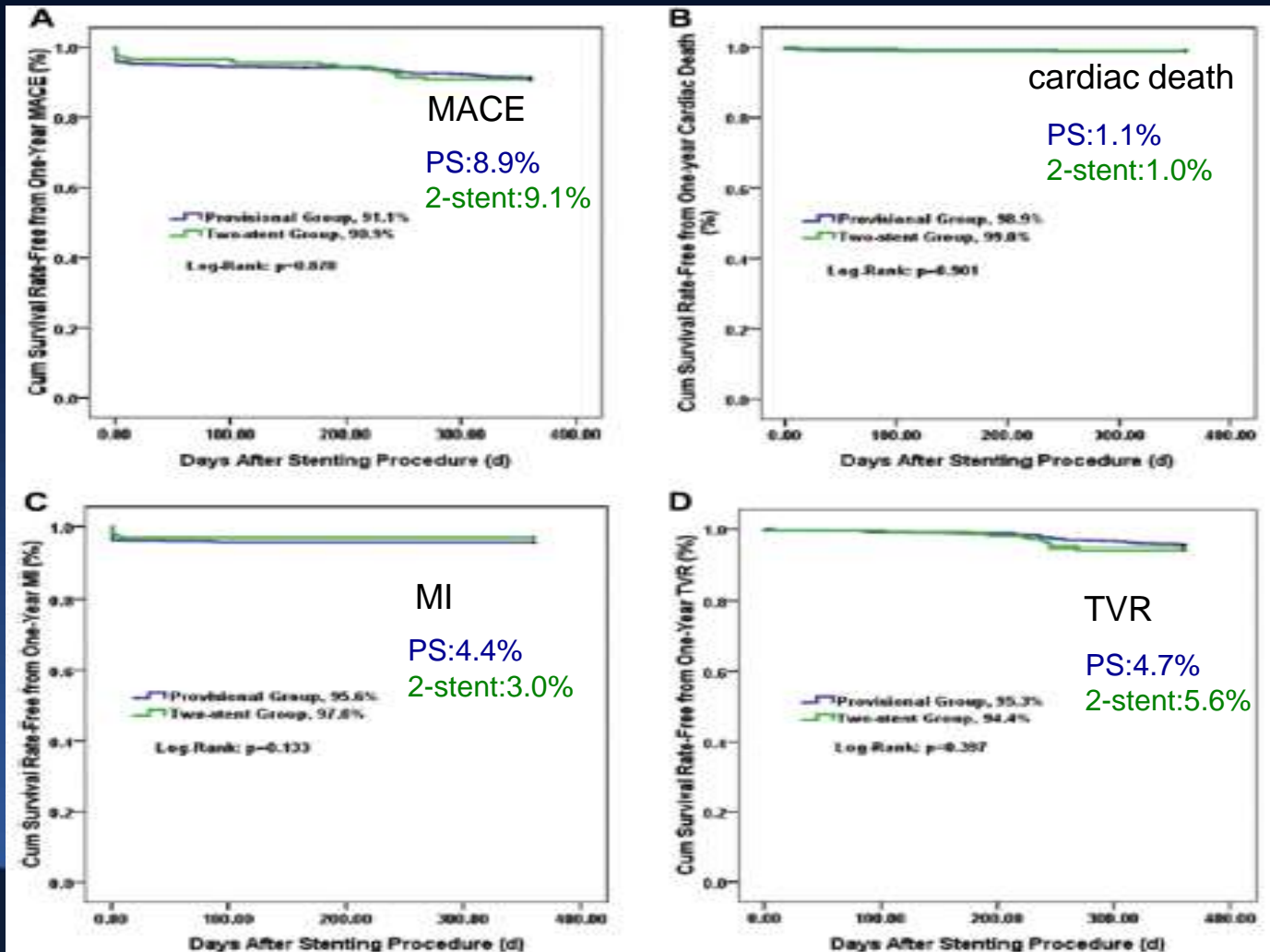
Simple vs. Complex BL

1-year FU



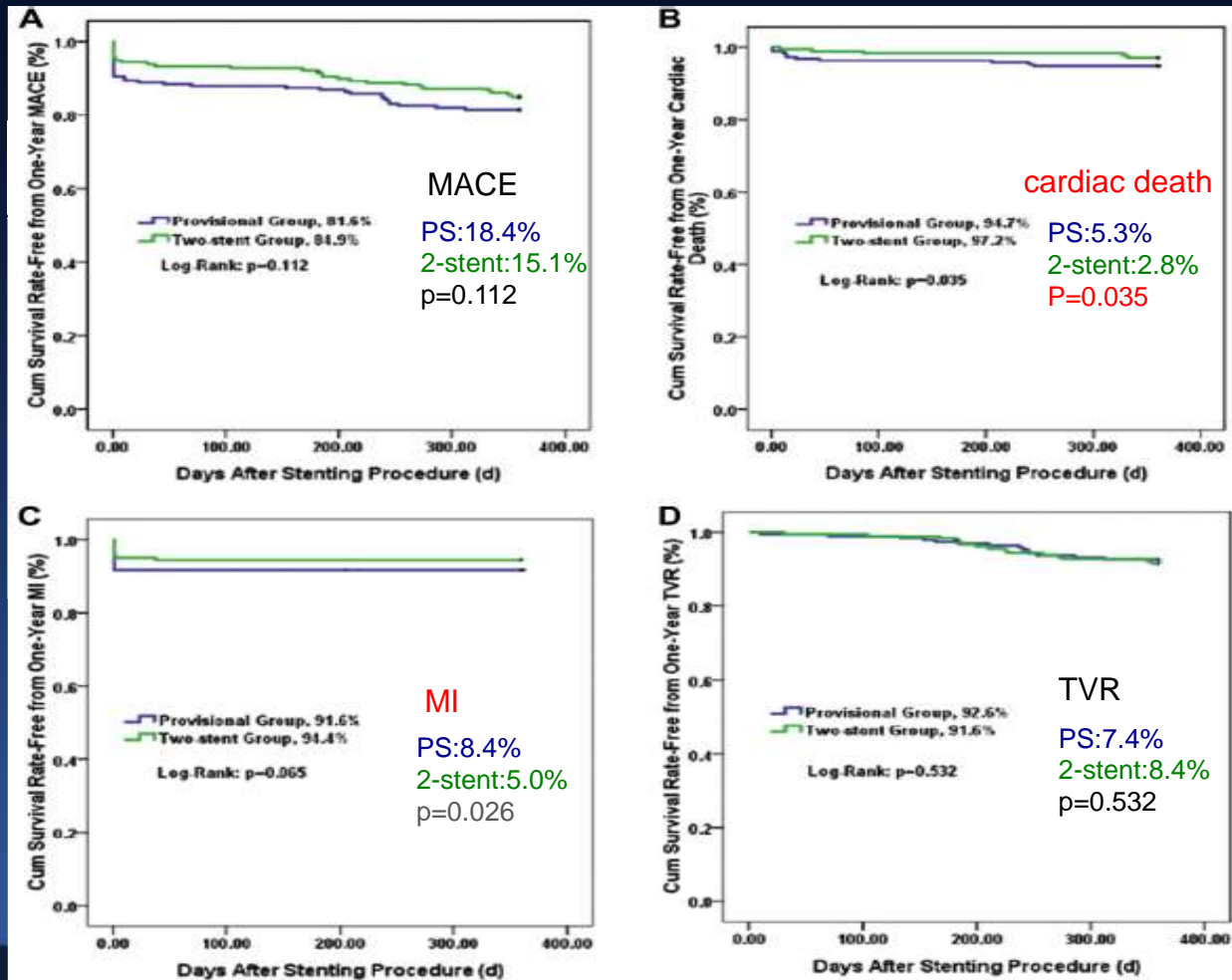
Simple BL (n=2552)

PS(77%) vs.2-stent(23%)



Complex BL (n=1108)

PS(52%) vs.2-stent(48%)

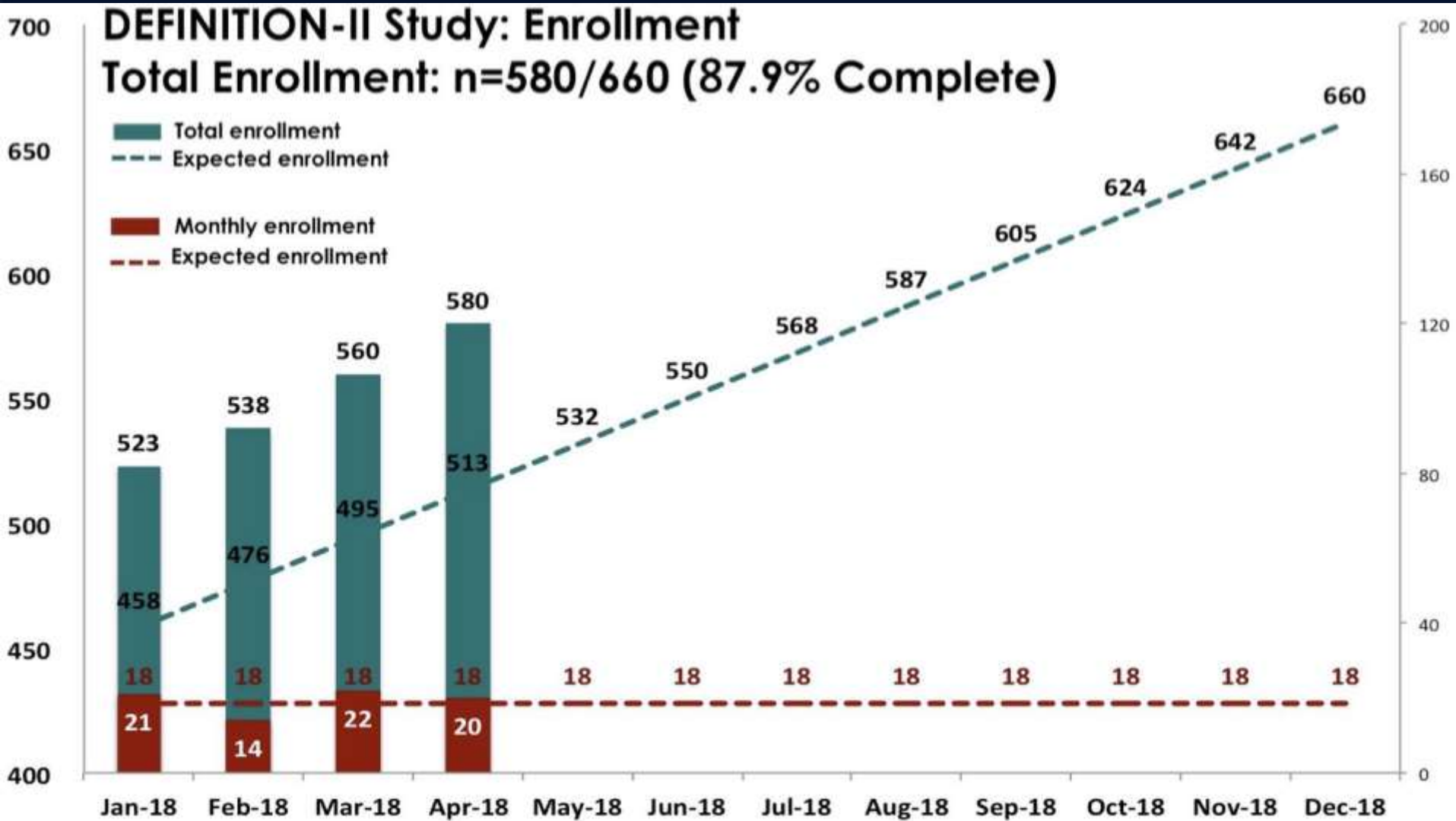


BMJ Open Treatment effects of systematic two-stent and provisional stenting techniques in patients with complex coronary bifurcation lesions: rationale and design of a prospective, randomised and multicentre **DEFINITION II** trial

Jun-Jie Zhang,¹ Xiao-Fei Gao,¹ Ya-Ling Han,² Jing Kan,³ Ling Tao,⁴ Zhen Ge,¹ Damras Tresukosol,⁵ Shu Lu,⁶ Li-Kun Ma,⁷ Feng Li,⁸ Song Yang,⁹ Jun Zhang,¹⁰ Muhammad Munawar,¹¹ Li Li,¹² Rui-Yan Zhang,¹³ He-Song Zeng,¹⁴ Teguh Santoso,¹⁵ Ping Xie,¹⁶ Ze-Ning Jin,¹⁷ Leng Han,¹⁸ Wei-Hsian Yin,¹⁹ Xue-Song Qian,²⁰ Qi-Hua Li,²¹ Lang Hong,²² Chotnoparatpat Paiboon,²³ Yan Wang,²⁴ Li-Jun Liu,²⁵ Lei Zhou,²⁶ Xue-Ming Wu,²⁷ Shang-Yu Wen,²⁸ Qing-Hua Lu,²⁹ Jun-Qiang Yuan,³⁰ Liang-Long Chen,³¹ Francesco Lavarra,³² Alfredo E Rodríguez,³³ Li-Min Zhou,³⁴ Shi-Qin Ding,³⁵ Kitigon Vichairuangthum,³⁶ Yuan-Sheng Zhu,³⁷ Meng-Yue Yu,³⁸ Chan Chen,³⁹ Imad Sheiban,⁴⁰ Yong Xia,⁴¹ Yu-Long Tian,⁴² Zheng-Lu Shang,⁴³ Qing Jiang,⁴⁴ Yong-Hong Zhen,⁴⁵ Xin Wang,⁴⁶ Fei Ye,¹ Nai-Liang Tian,¹ Song Lin,¹ Zhi-Zhong Liu,¹ Shao-Liang Chen^{1,3}



DEFINITION II: Enrollment



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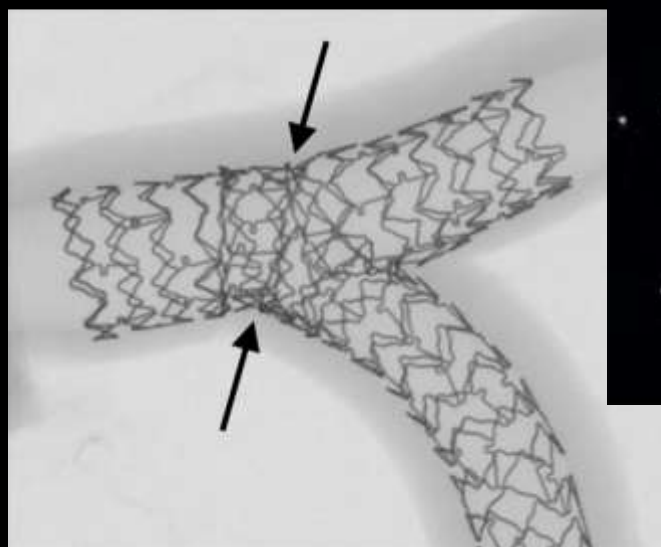
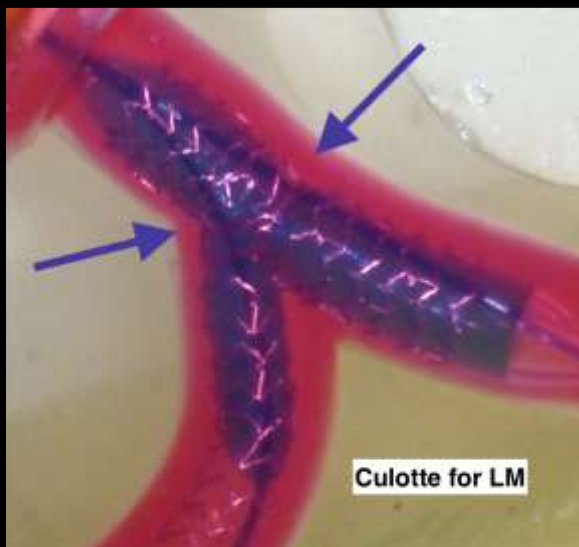
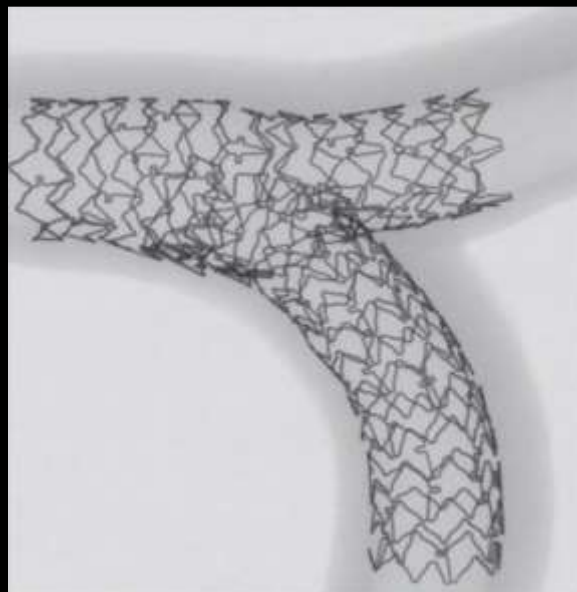
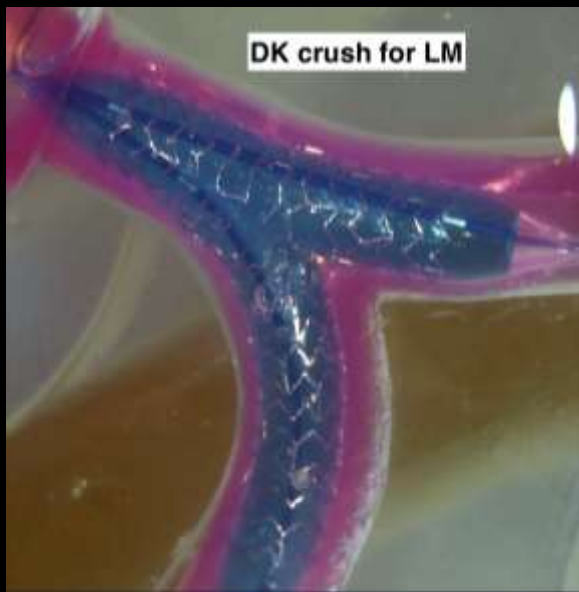
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Clinical Outcome of Double Kissing Crush Versus Provisional Stenting of Coronary Artery Bifurcation Lesions

The 5-Year Follow-Up Results From a Randomized and Multicenter DKCRUSH-II Study (Randomized Study on Double Kissing Crush Technique Versus Provisional Stenting Technique for Coronary Artery Bifurcation Lesions)

Shao-Liang Chen, MD; Teguh Santoso, MD; Jun-Jie Zhang, PhD; Fei Ye, MD;

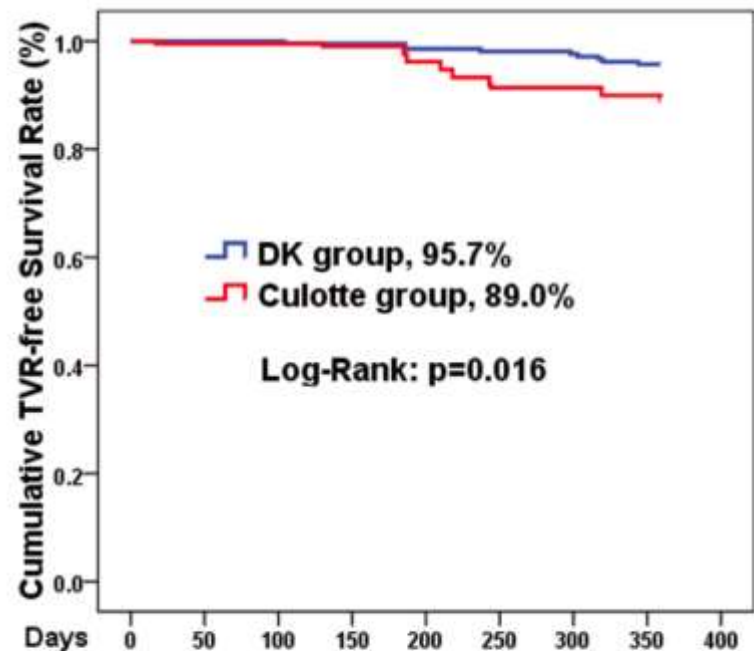
	DK Crush (n=183)		PS (n=183)		P Value*
		Complex		Complex	
No. of patients		32		19	
MACE		5 (15.6)		8 (42.1)	0.036
Cardiac death		1 (3.1)		1 (5.3)	0.704
MI		1 (3.1)		1 (5.3)	0.704
TLR		4 (12.5)		7 (36.8)	0.041
CABG		0		0	NS
TVR		6 (18.8)		8 (42.1)	0.042
ST		1 (3.1)		1 (5.3)	0.704
Definite		0		0	NS
Probable		1 (3.1)		2 (10.6)	0.168



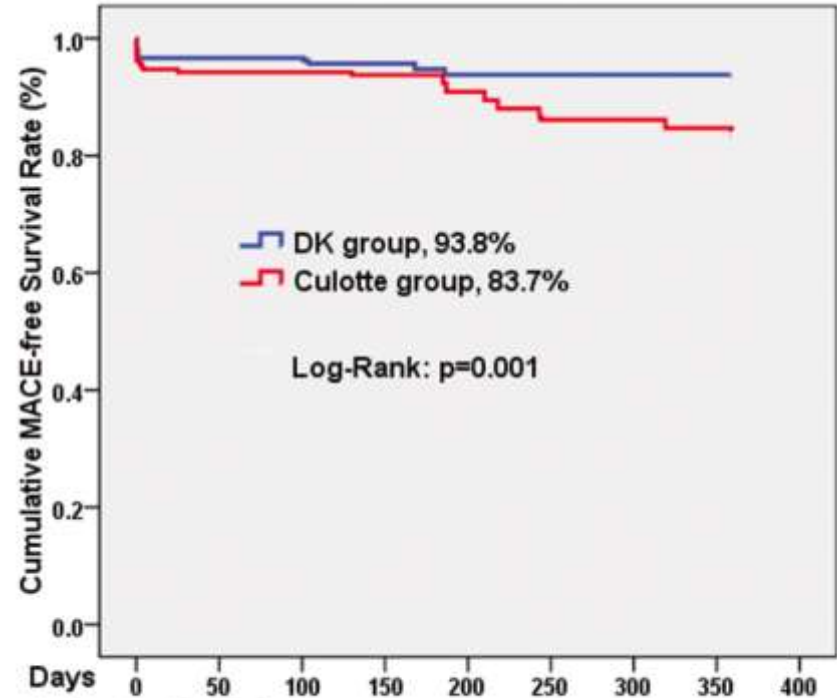
- Significant “napkin ring” restriction (arrow)

Comparison of DK Crush Versus Culotte Stenting for Unprotected Distal Left Main Bifurcation Lesions

Results From a Multicenter, Randomized, Prospective DKCRUSH-III Study



Patients at risk (n)		0	50	100	150	200	250	300	350	400
DK	210	210	210	210	209	207	206	205	201	201
Culotte	209	208	208	208	207	201	191	191	188	188



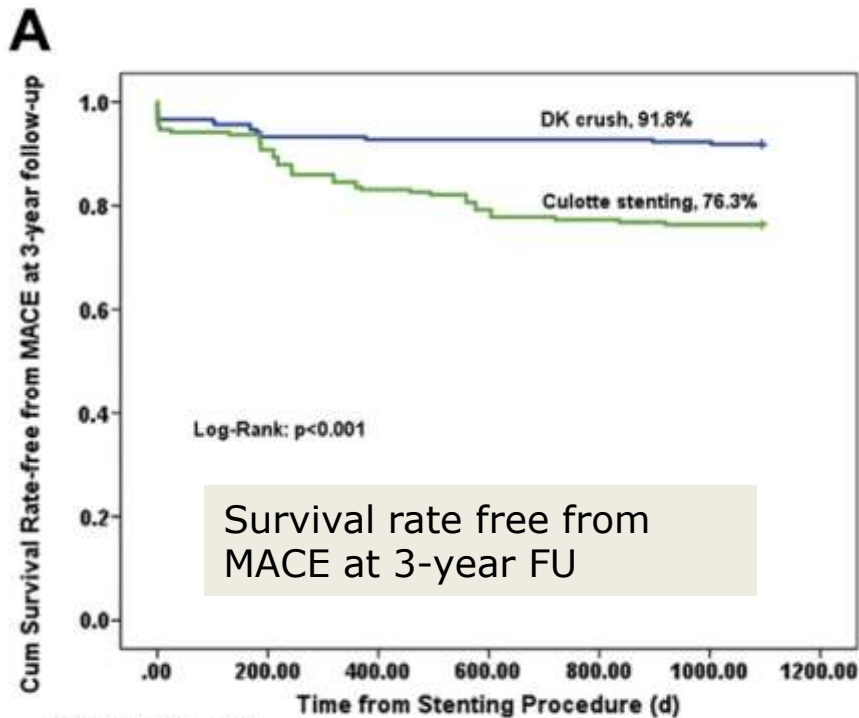
Patients at risk (n)		0	50	100	150	200	250	300	350	400
DK	210	203	203	201	201	197	197	197	197	197
Culotte	209	197	197	197	196	190	180	180	177	175

Clinical Outcome After DK Crush Versus Culotte Stenting of Distal Left Main Bifurcation Lesions

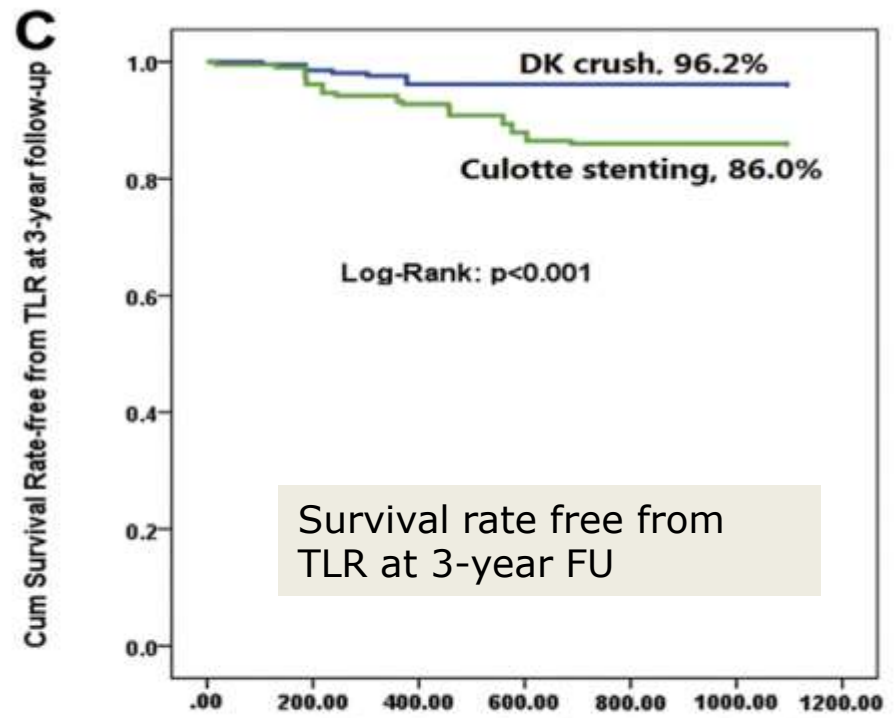


The 3-Year Follow-Up Results of the DKCRUSH-III Study

Shao-Liang Chen, MD,* Bo Xu, MBBS,† Ya-Ling Han, MD,‡ Imad Sheiban, MD,§ Jun-Jie Zhang, MD,* Fei Ye, MD,*



No. patients at risk		Time from Stenting Procedure (d)						
		.00	200.00	400.00	600.00	800.00	1000.00	1200.00
DK	208	196	193	193	193	192	191	
Culotte	207	194	173	164	160	158	158	



No. patients at risk		Time from Stenting Procedure (d)						
		.00	200.00	400.00	600.00	800.00	1000.00	1200.00
DK	208	205	200	200	200	200	200	200
Culotte	207	199	192	182	178	178	178	178



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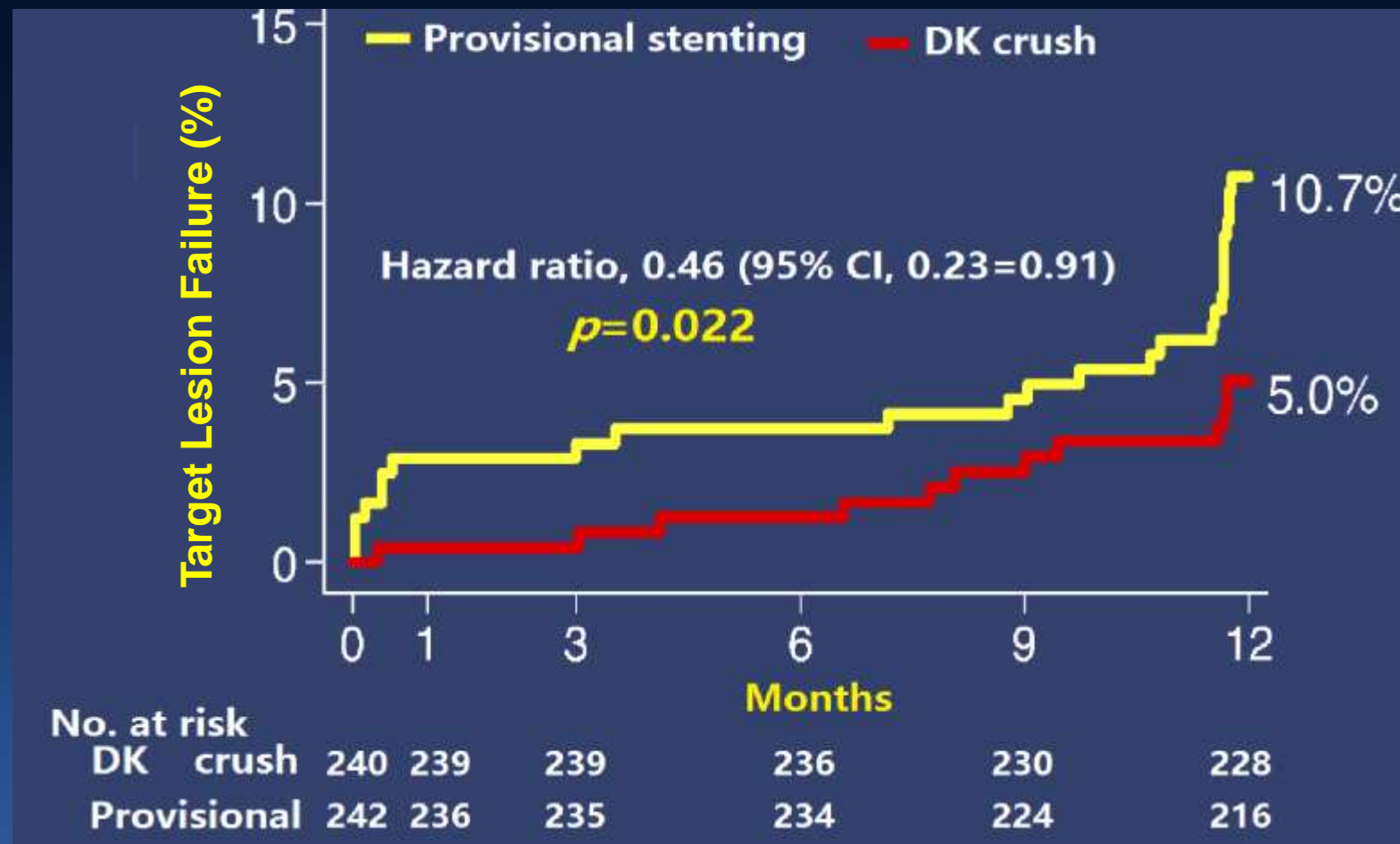
<https://doi.org/10>

Double Kissing Crush Versus Provisional Stenting for Left Main Distal Bifurcation Lesions DKCRUSH-V Randomized Trial

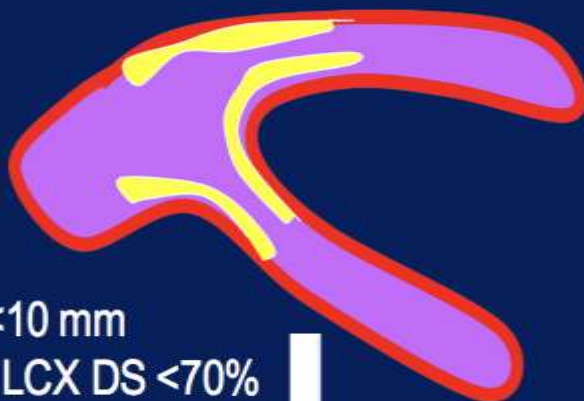
Shao-Liang Chen, MD,^a Jue-Jie Zhang, PhD,^a Yaling Han, MD,^b Jing Kan, MBBS,^a Lianglong Chen, MD,^c Chunguang Qiu, MD,^d Tiemin Jiang, MD,^e Ling Tao, MD,^f Hesong Zeng, MD,^g Li Li, MD,^h Yongyu Gao, MD,ⁱ Teguh Santoso, MD,^k Chootopol Paiboon, MD,^l Yan Wang, MD,^m Tak W. Kwak, MD,ⁿ Nailiang Tian, MD,^o Zhizhong Liu, PhD,^a Song Lin, MD,^o Chengzhi Lu, MD,^p Shangyu Wen, MD,^q Qi Zhang, MD,^s Imad Sheiban, MD,^t Yawei Xu, MD,^u Lefeng Wang, MD,^v Tanveer S. Rab, MD,^v Guanchang Cheng, MD,^y Lianqun Cui, MD,^z Martin B. Leon, MD,^{aa} Gregg W. Stone, MD^{aa}



Primary Endpoint TLF at 1-y



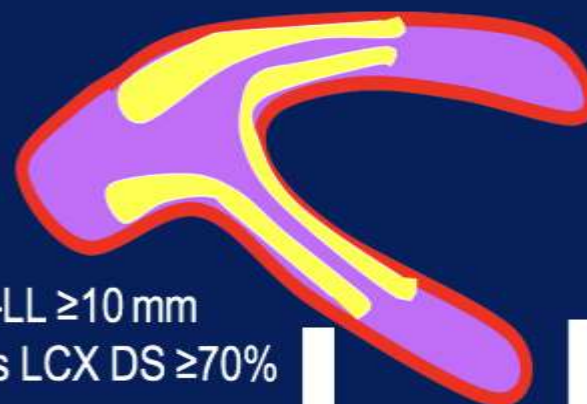
Target Lesion Failure at 1-Year Simple vs. Complex Bifurcation Lesions



LCX-LL < 10 mm
and/or os LCX DS < 70%



Simple Lesions



LCX-LL ≥ 10 mm
and os LCX DS ≥ 70%

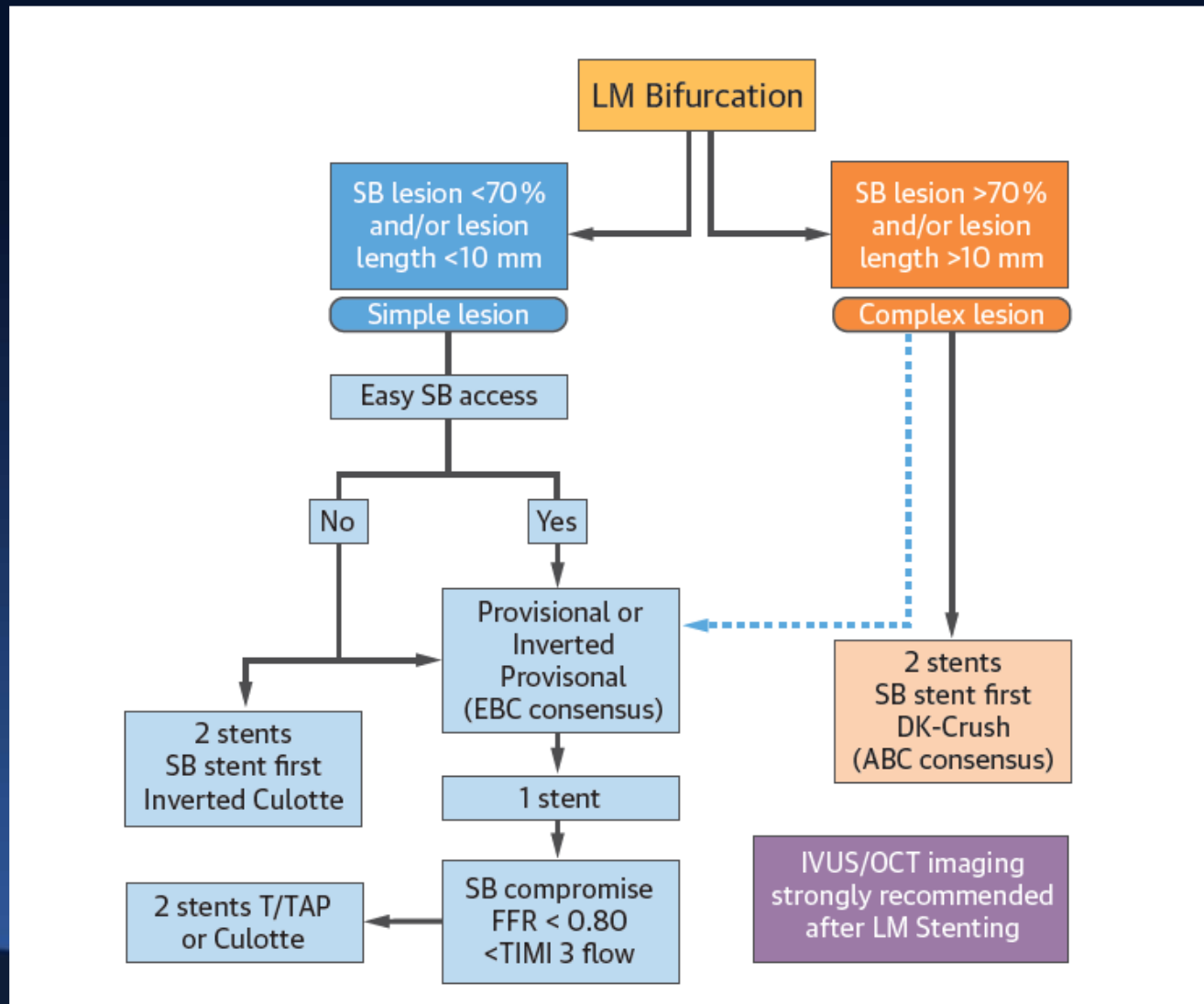


Complex Lesions

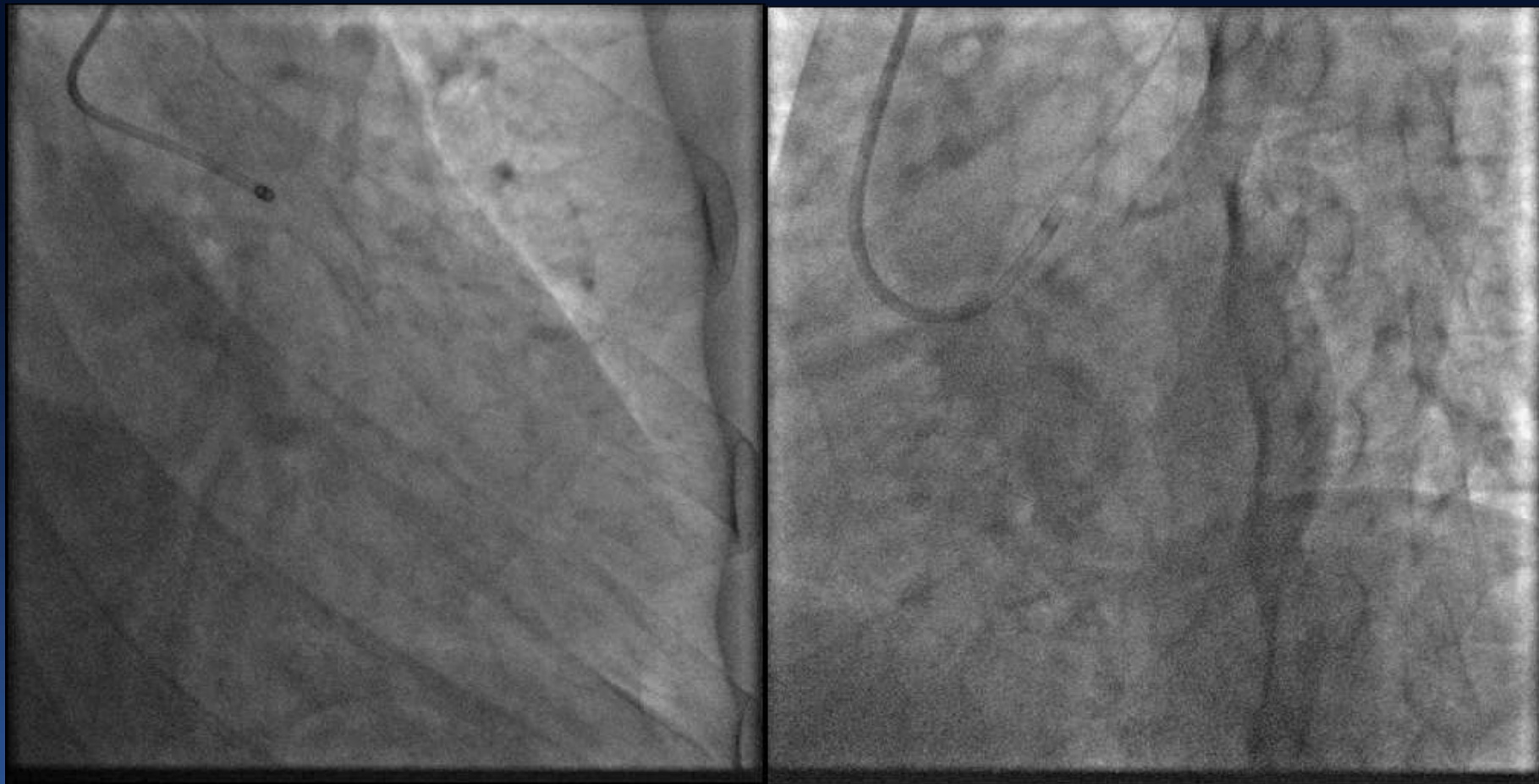
Plus ≥ 2 of 6
minor criteria



Current Intervention for LM Bifurcations

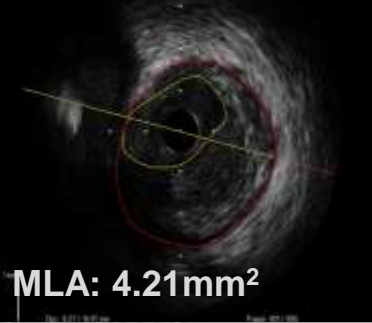


- 46-ys male, UAP,EF:61%

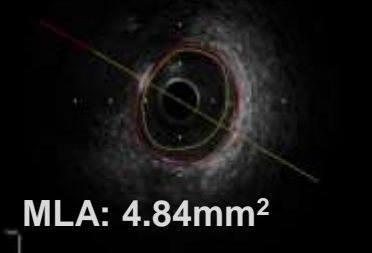


- Distal LM(1,1,1) : 90% stenosis
- Simple LM bifurcation
- Provisional stenting with IVUS guidance

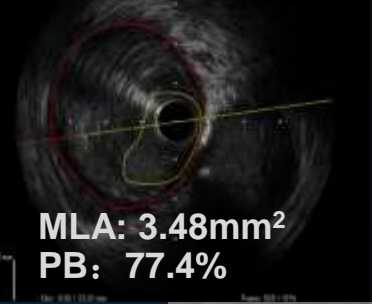
Ostial-LCX



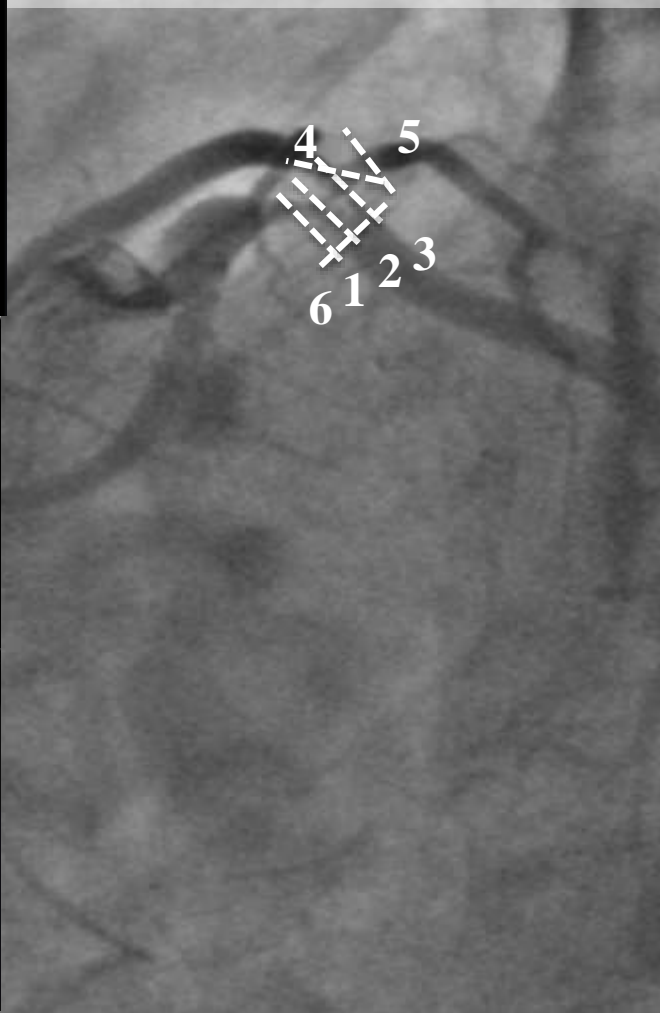
ostial-D1



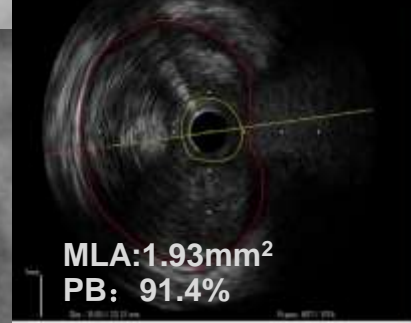
Proximal-LAD



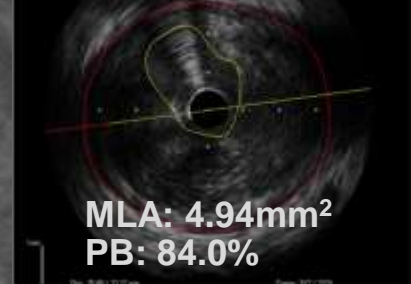
IVUS Finding before Predilatation



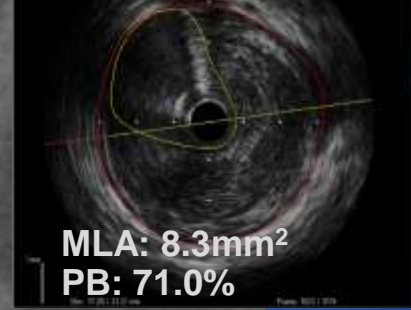
Ostial-LAD



POC



Distal-LM



Cutting Balloon pre-dilatation



LAD: 3.5/10 Flextome@12atm



LCX: 3.5/10 Flextome@12atm



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Stenting LM-LAD with jailed wire



LM-LAD: 3.5/30 Resolute @ 10atm



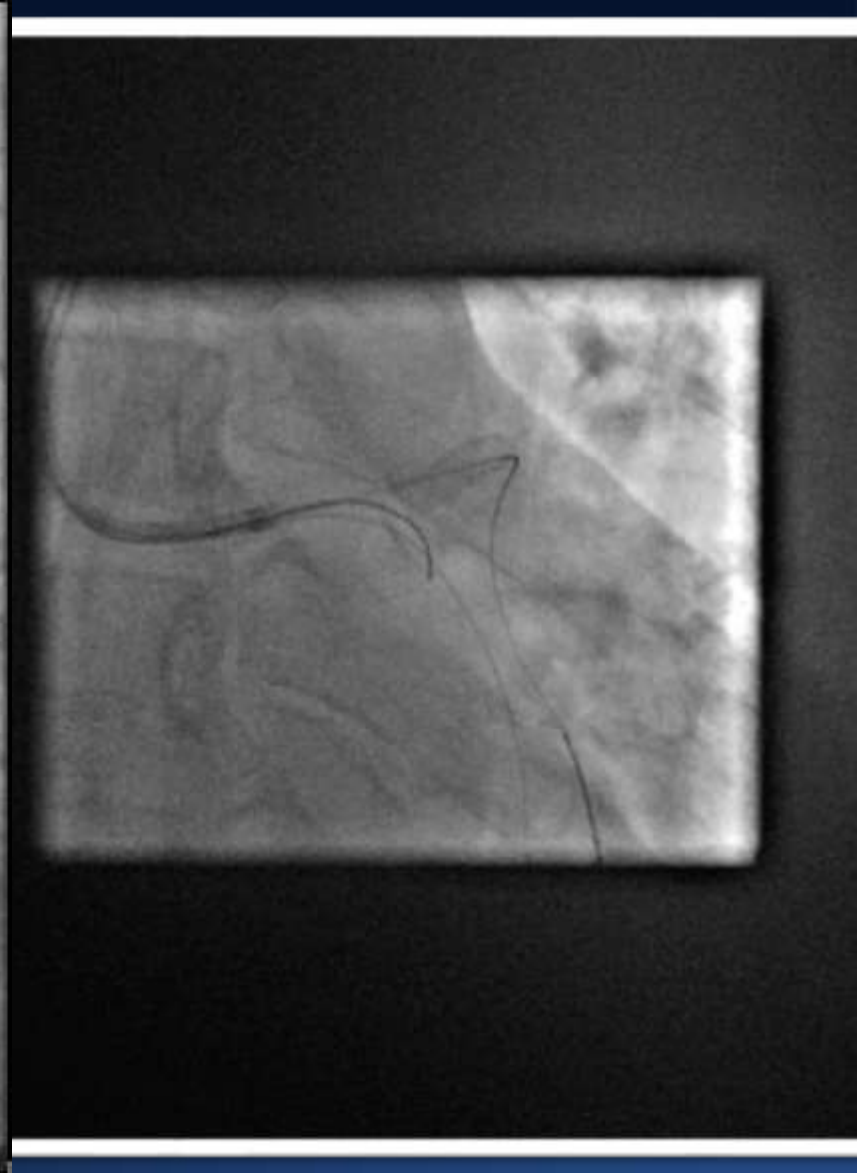
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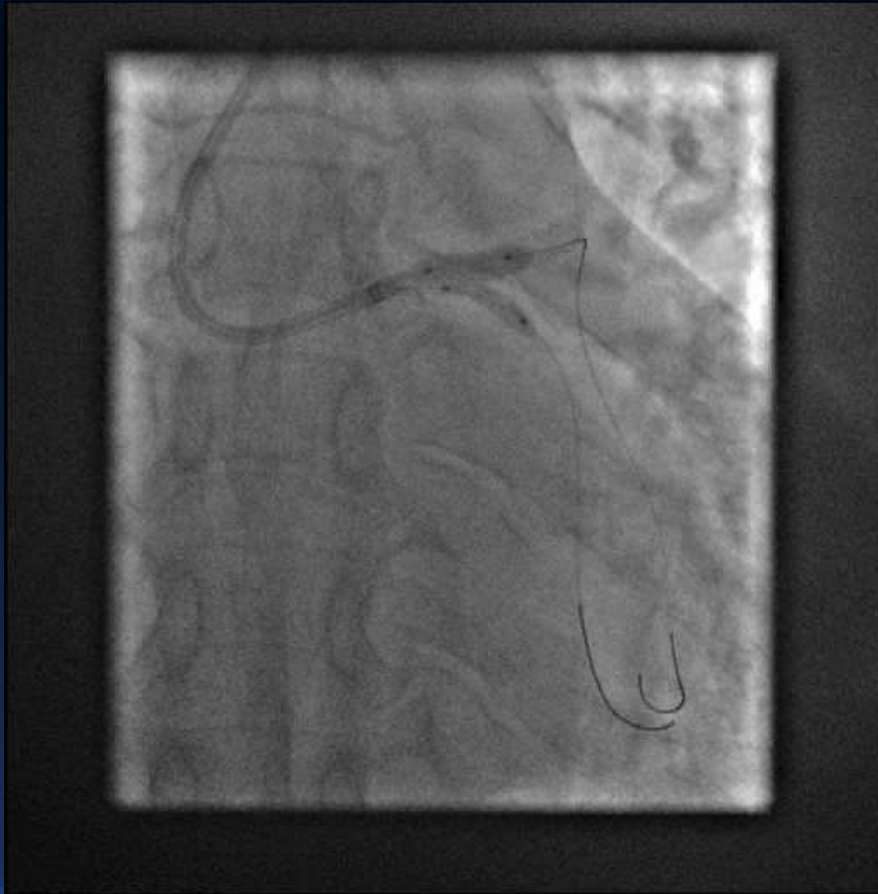
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POT and distal access SB

LM: 5.0/08 Quantum @ 20atm



Kissing Inflation and Re-POT



LAD: 4.0/12 NC sprinter@8atm
LCX: 3.5/12 NC sprinter@8atm



LM: 5.0/8 Quantum@ 20atm



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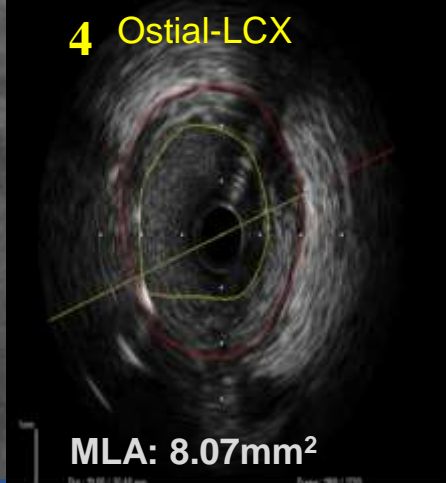
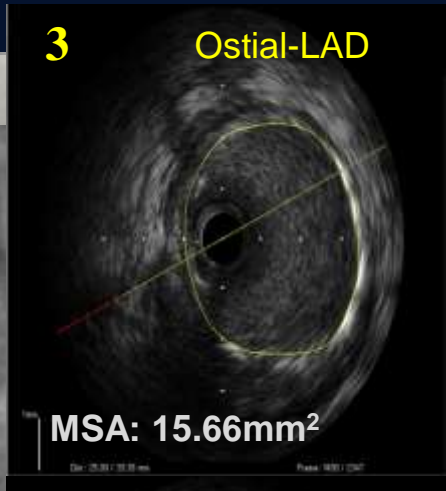
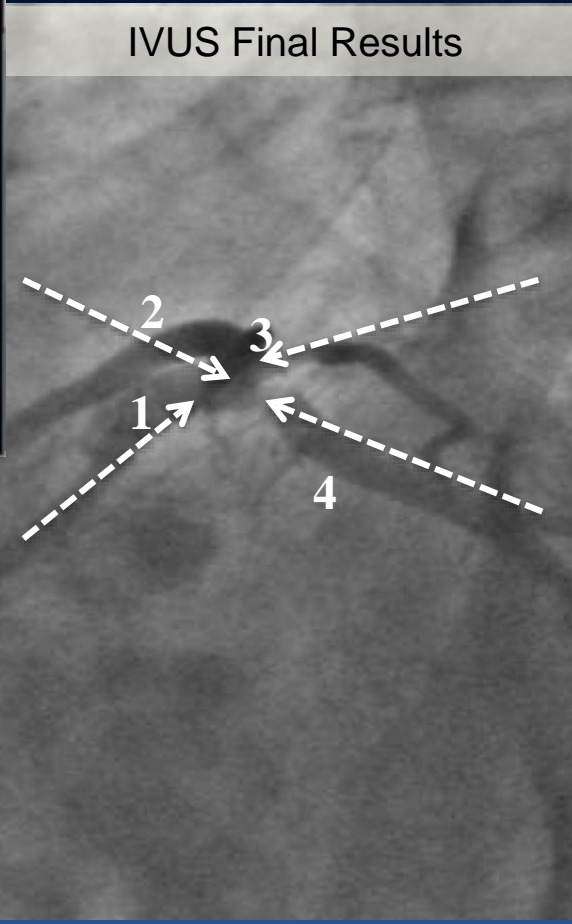
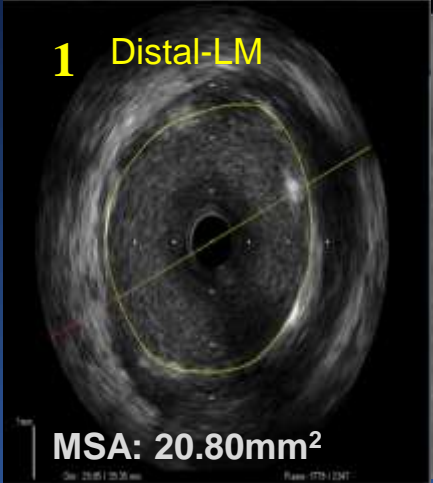
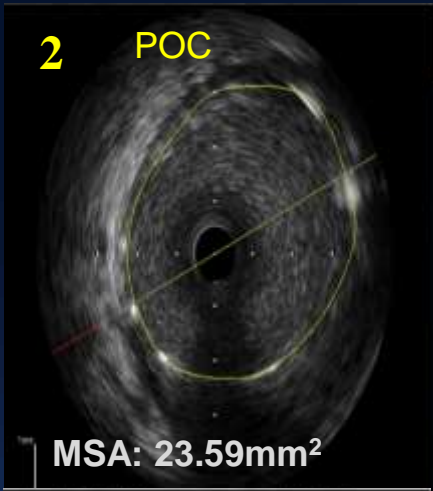
Final Result



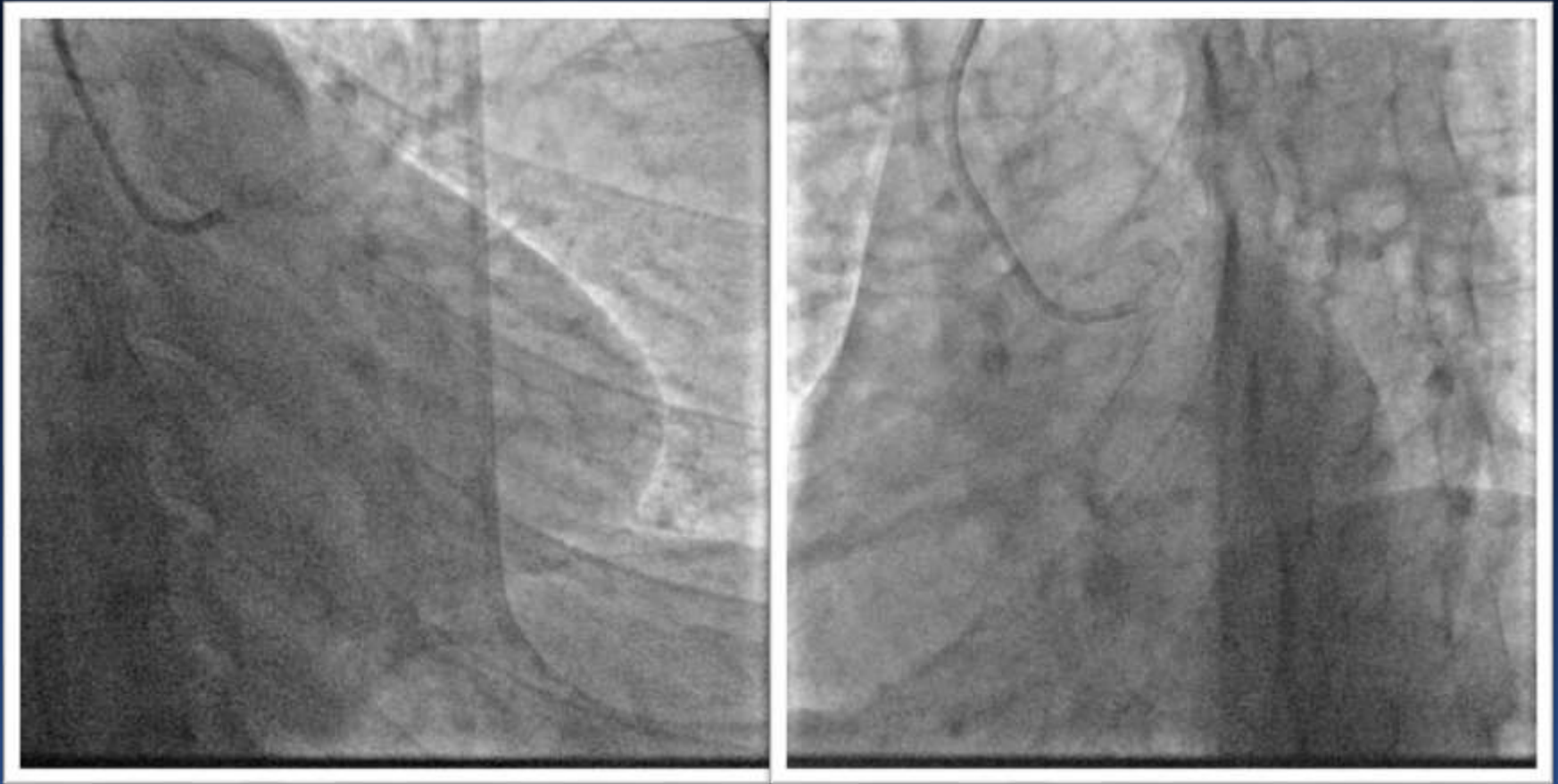
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13-month Angiographic FU

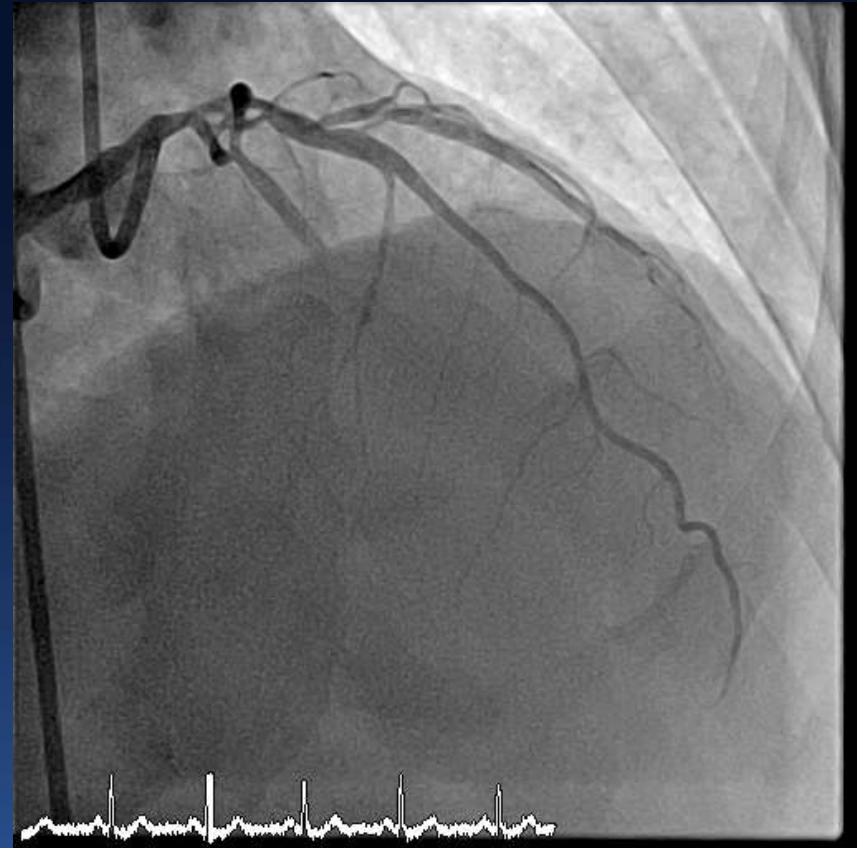
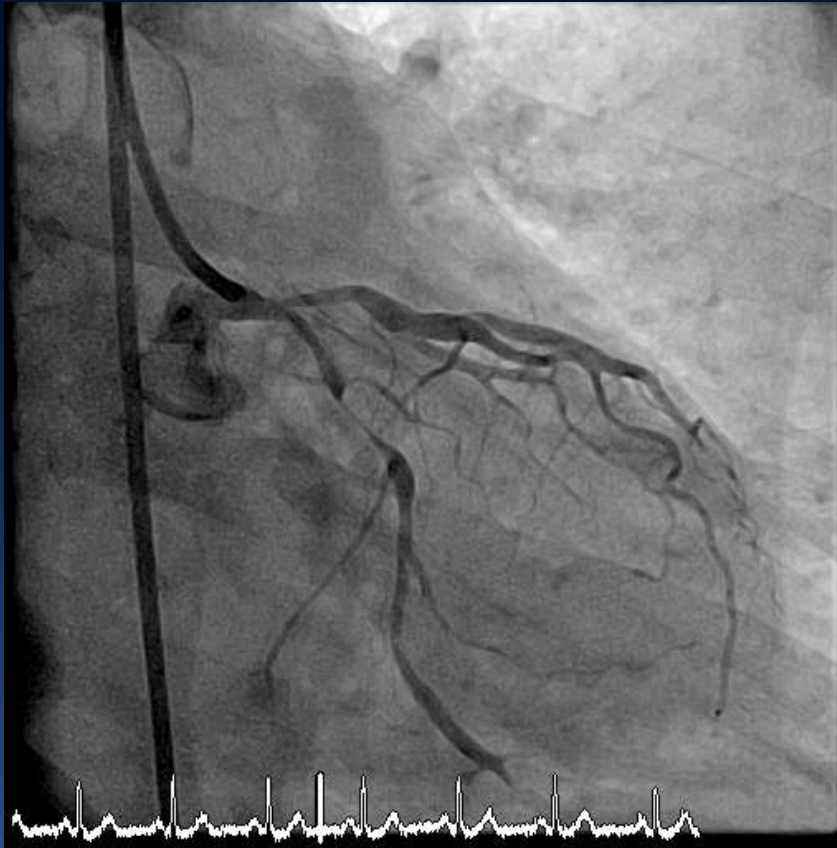


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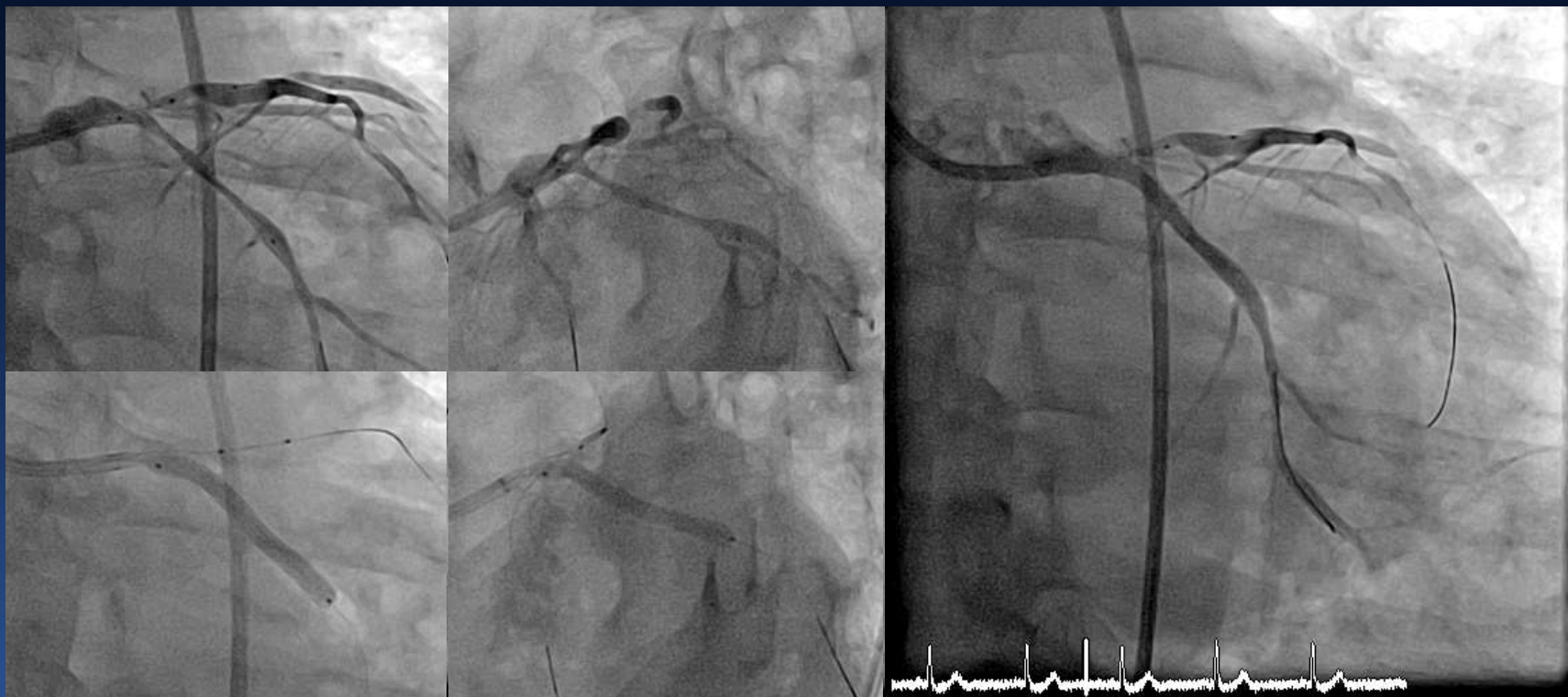
- 64-ys male, UAP, EF:64%



- Distal LM(1,1,1)
- Complex LM bifurcation
- DK crush with IVUS guidance



DK crush – Step 1: stenting LCX



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DK crush—Step 2: balloon crush



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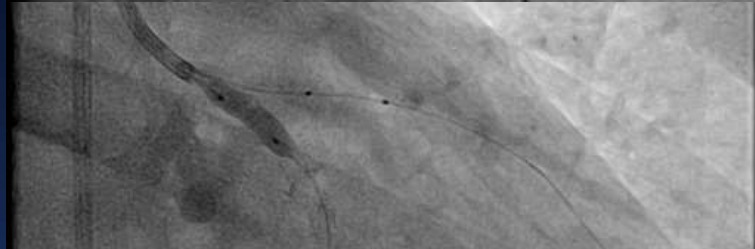


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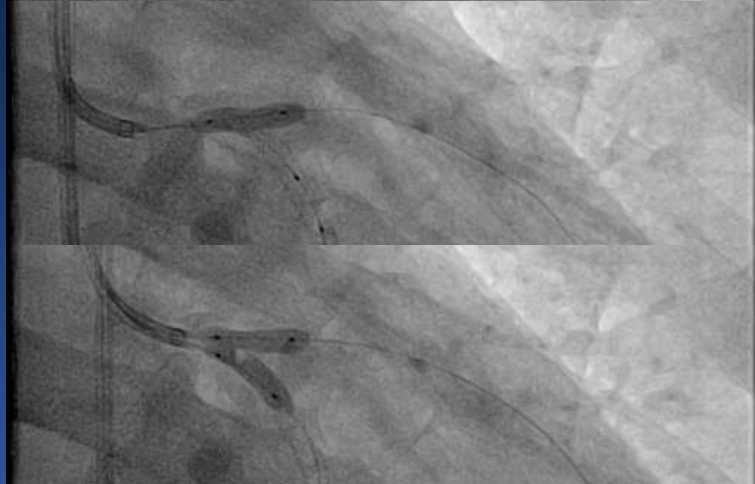
Tips of 1st rewiring LCX



1st Rewiring from Proximal Cells
of Ostial LCX Stent



Sequential dilation



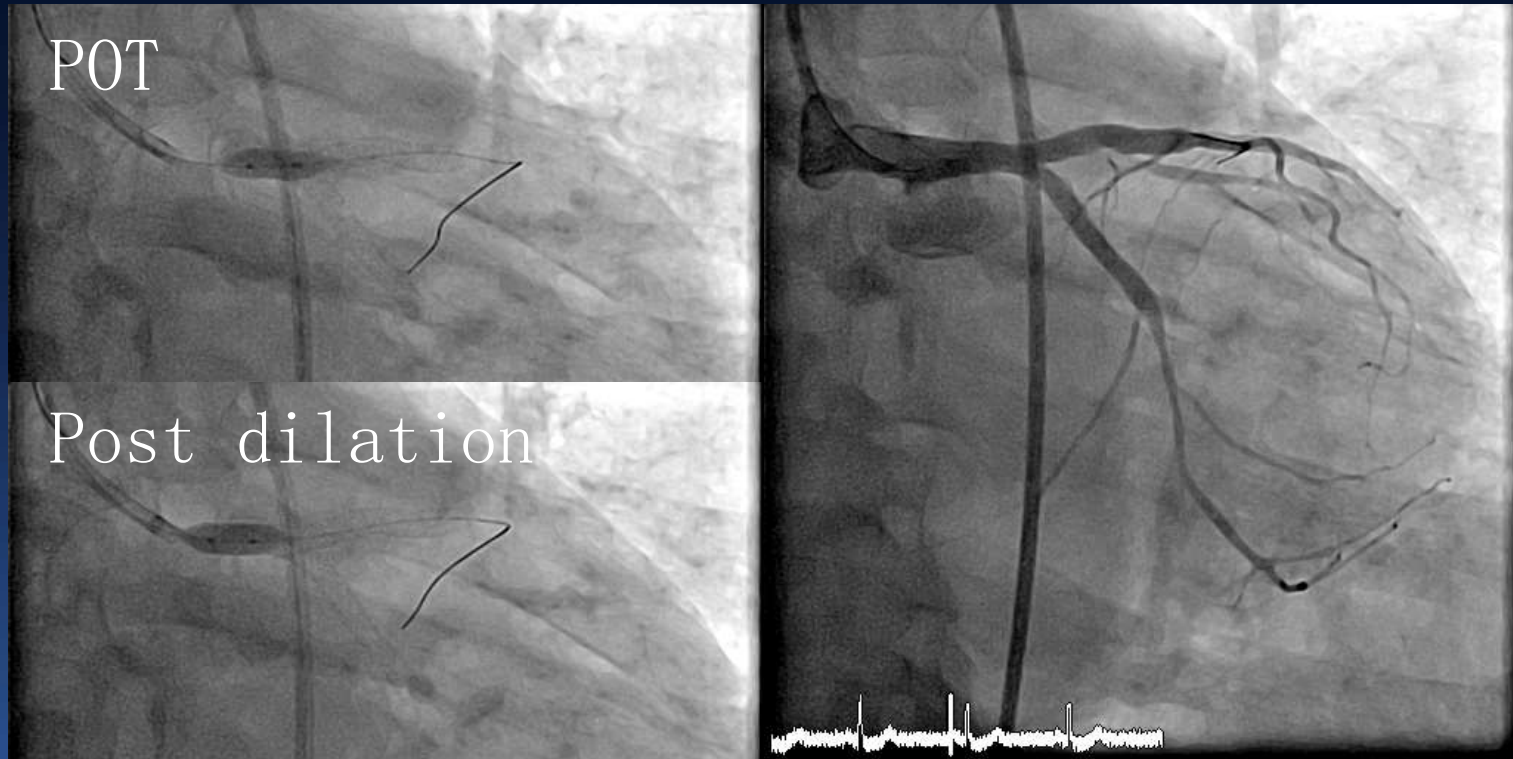
First kissing balloon inflation

DK crush—Step 3: first kissing inflation

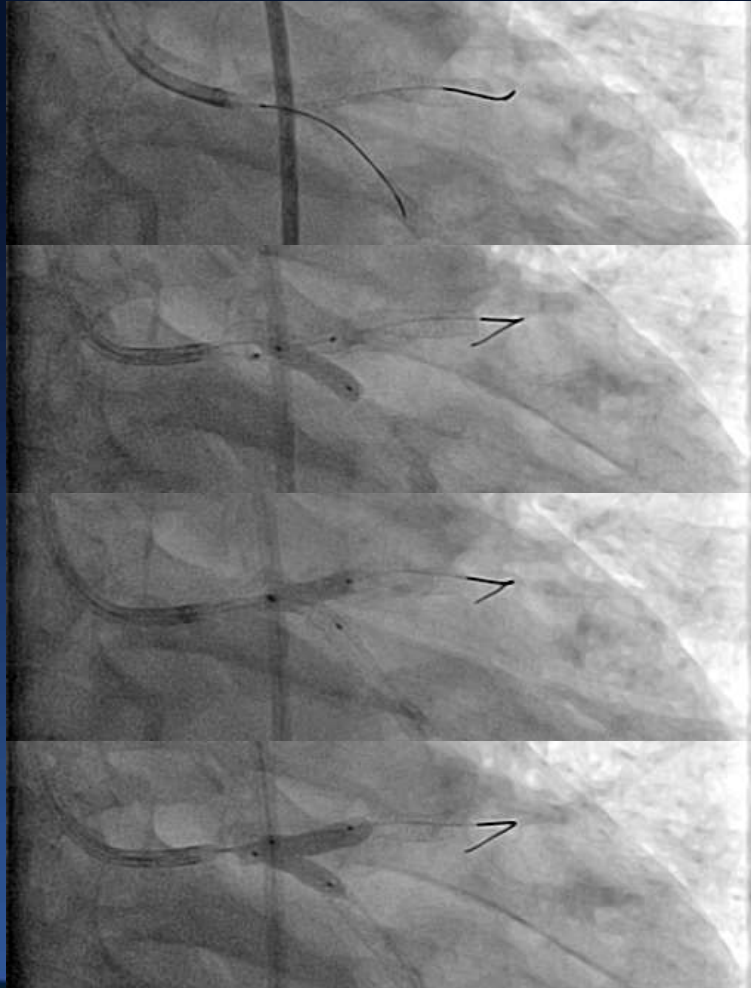
DK crush—Step 4: stenting LAD-LM



DK crush—Step 5: POT



DK crush—Step 6: Final KBI



2nd Rewiring from Proximal-mid Cells of Ostial LCX Stent

Sequential dilation

Final kissing balloon inflation

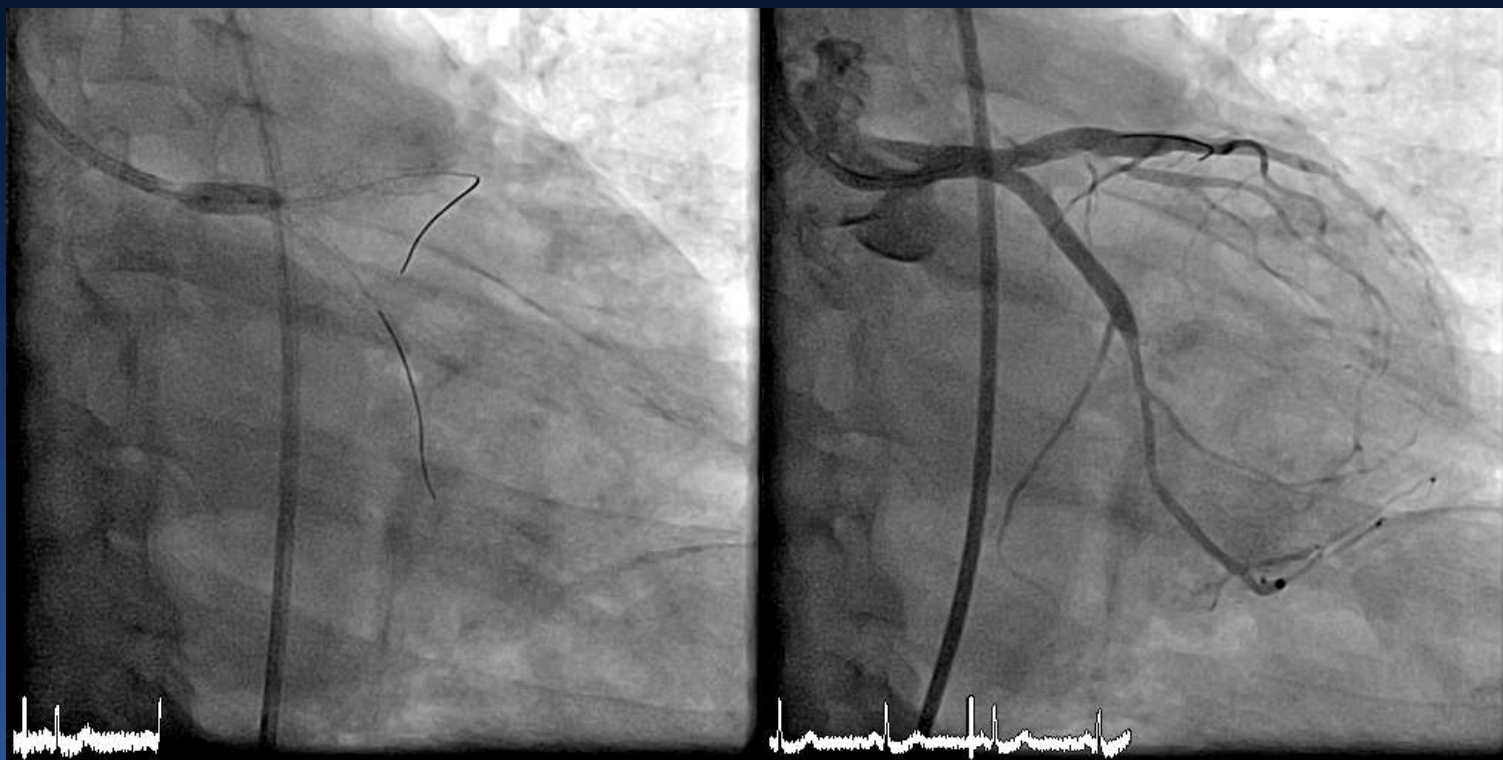


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DK crush—Step 4: Final POT



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Final Results



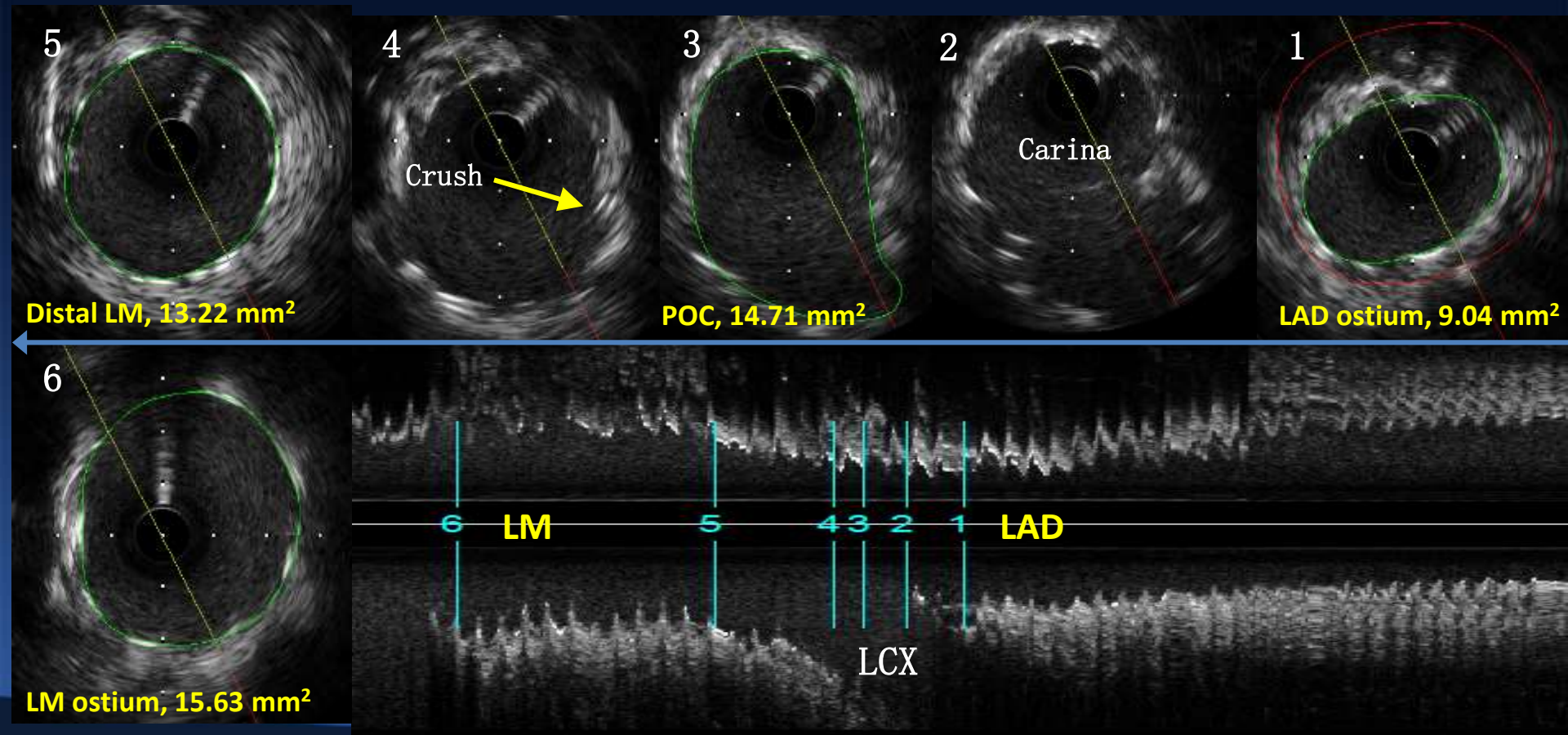
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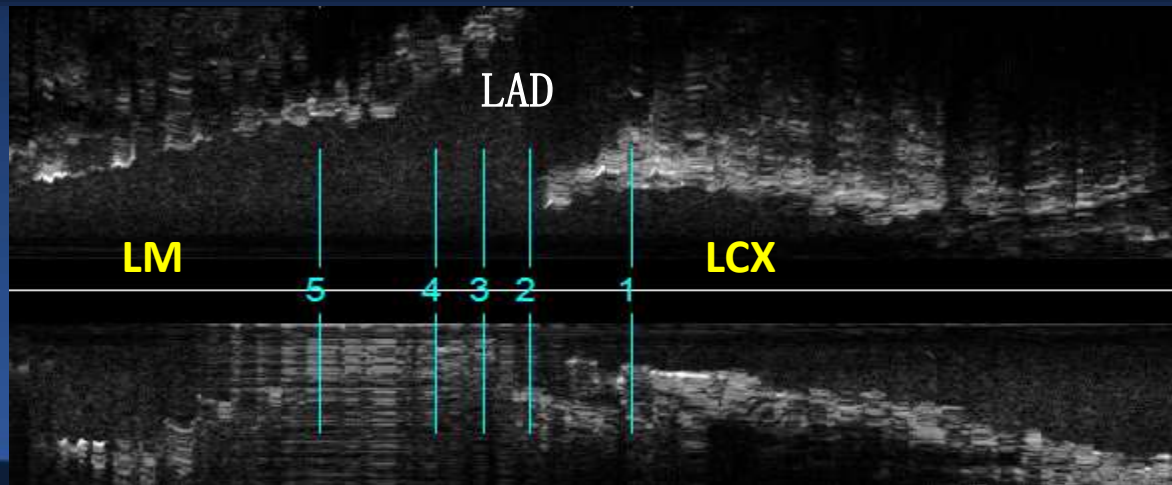
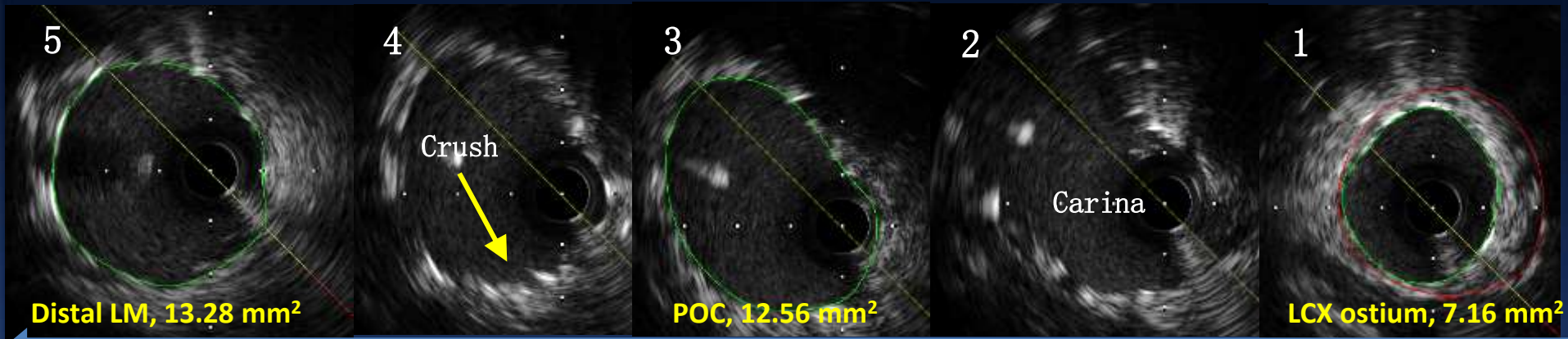
IVUS results

LM-LAD



IVUS results

LM-LCX



Take Home Message

- The DEFINITION criteria can differentiate complex from simple bifurcation lesions(BLs).
- For simple BLs, provisional SB stenting should be the default approach.
- For complex LM BLs, 2-stent technique especially DK crush was associated with superior result compared to culotte.
- Intro-coronary imaging guided LM stenting could improve clinical outcomes through facilitating stenting optimization
- **DEFINITION-II trial (NCT02284750)** randomly comparing 2-stent vs. PS for the treatment of Complex BLs is on-going.



Thanks for Your Attention !



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